AUTHORIZING LEGISLATION

HEARINGS

BEFORE THE

SUBCOMMITTEE ON AUTHORIZING LEGISLATION

OF THE

JOINT COMMITTEE ON ATOMIC ENERGY CONGRESS OF THE UNITED STATES

EIGHTY-FOURTH CONGRESS

FIRST SESSION

ON

AUTHORIZING LEGISLATION

MAY 2, 9, 10 and 31, 1955

Printed for the use of the Joint Committee on Atomic Energy

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AUTHORIZING LEGISLATION

MONDAY, MAY 2, 1955

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
SUBCOMMITTEE ON AUTHORIZING LEGISLATION,
Washington, D. C.

The subcommittee met, pursuant to call, at 10:08 a. m., in the committee room, the Capitol, Representative Chet Holifield (chairman of the subcommittee) presiding.

Present: Representatives Holifield (presiding), Durham, Price, Cole, and Patterson; Senator Hickenlooper.

Representing the Atomic Energy Commission: Willard F. Libby, Acting Chairman; Thomas E. Murray, Commissioner; K. E. Fields, General Manager; R. W. Cook, Deputy General Manager; A. Tammaro, Assistant General Manager; William Mitchell, General Counsel; Don S. Burrows, Controller; Jesse C. Johnson, Raw Materials Division; Edward J. Bloch, Production Division; W. Kenneth Davis, Reactor Development Division; T. H. Johnson, Research Division; John C. Bugher, Biology and Medicine Division; John A. Derry, Construction and Supply Division; Lawrence P. Gise, Military Application Division; Charles F. Eason, Office of General Counsel; F. J McCarthy, Jr., Assistant Controller for Budgets.

Members of the committee staff: Corbin C. Allardice, executive director; Messrs. Brobeck, Hamilton, Mansfield, Norris, and Selkowitz.

Representative HOLIFIELD. The subcommittee will be in order.

We are glad to welcome the AEC Commissioners and their Program Division Directors here this morning for the first review of the Commission's fiscal year 1956 construction budget.

This meeting was called under the provisions of section 261 of the Atomic Energy Act of 1954, so that the Subcommittee on Authorization may hear the presentation and defense of the AEC request for authorizing legislation in the amount of $293,750,000, of which it is proposed to obligate during fiscal year 1956 $252,750,000.

Since this is the first application of authorizing legislation on construction items, the Joint Committee, through this subcommittee must make several basic determinations. From these hearings and the resultant determinations will come the legislation authorizing the appropriation of funds to permit the AEC to carry on an adequate and aggressive program.

It is not the desire of this committee to encumber the AEC in carrying out its responsibilities under the act of 1954. The Joint Committee can be proud that its past record of assistance to the AEC has played a part in this country's position of preeminence in both military and peaceful applications of atomic energy.

We desire to continue being helpful in the orderly and efficient prosecution of the program.

As a result of many years' experience, both on the atomic energy and military programs, the Joint Committee concluded that the discipline of authorizing legislation was desirable to the maturing atomic-energy program and therefore drafted such language as a section of the present Atomic Energy Act of 1954.

At this point I should like to read into the record the pertinent parts of section 261:

SEC. 261. APPROPRIATIONS.—There are hereby authorized to be appropriated such sums as may be necessary and appropriate to carry out the provisions and purposes of this act except such as may be necessary for acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion.

On November 19, 1954, shortly after the signing of Public Law 703, the committee wrote the AEC quoting the language of section 261, and asked—and I quote:

It would be greatly appreciated therefore if the AEC would inform the committee at the earliest time possible as to how the AEC proposes to initiate requests for authorizing legislation, together with AEC's views on the legal scope of the exception clause.

No written reply was received from AEC until January 20, 1955, when a letter was received covering the construction budget items totaling $242,500,000, together with a draft of proposed legislation. In this letter one paragraph seems to be intended as a reply to the committee request mentioned above.

As we view the exceptions in section 261 of the Atomic Energy Act of 1954, only appropriations for the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion require authorization. As a practical matter, however, because of the difficulty of determining which kind of projects fall within the scope of the exceptions and which are exempt from it, and in order to maintain our present budget structure and system of accounts, we have included in the proposed legislation an authorization for all items covered by our plant and equipment appropriation. In connection with two items, authorization for the total cost of the projects is being requested, although a portion of the funds will not be requested until a later year.

I do not consider that the Commission was responsive to our request for the agency's interpretation of a law under which it must operate.

I would make one other comment on the AEC's decision to place certain items in this appropriation because they do not want to disturb their present budgetary or accounting systems. It is somewhat unusual in business and even more so in Government to find management decisions being made for the exclusive convenience of its auditor. Further, I would think the Commission would be interested in making sure it had solid authority to spend the money it asks to have appropriated. Yet we find that the operating budget request of the AEC contains many items which involve construction of plants or facilities and which are not here before us in the requested authorizing legislation.

I therefore suggest that you gentlemen of the AEC address yourselves to this problem at the outset. After that, I understand you desire to make your presentation on a program division basis.

The subcommittee members will find before them an outline of the items to be discussed as they will be taken up by AEC. Also there is before you a list of general questions, and another series of questions on each item in the construction budget. Both of these lists identify the budget item by number which may be found in the thick file which is in front of you.

Dr. Libby, are you leading off for the Commission?

STATEMENTS OF WILLIARD F. LIBBY, ACTING CHAIRMAN; THOMAS E. MURRAY, COMMISSIONER; K. E. FIELDS, GENERAL MANAGER; R. W. COOK, DEPUTY GENERAL MANAGER; A. TAMMARO, ASSISTANT GENERAL MANAGER FOR RESEARCH AND DEVELOPMENT; WILLIAM MITCHELL, GENERAL COUNSEL; DON S. BURROWS, CONTROLLER; JESSE C. JOHNSON, RAW MATERIALS DIVISION; EDWARD J. BLOCH, PRODUCTION DIVISION; W. KENNETH DAVIS, REACTOR DEVELOPMENT DIVISION; T. H. JOHNSON, RESEARCH DIVISION; JOHN C. BUGHER, BIOLOGY AND MEDICINE DIVISION; JOHN A. DERRY, CONSTRUCTION AND SUPPLY DIVISION; LAWRENCE P. GISF, MILITARY APPLICATION DIVISION; CHARLES F. EASON, OFFICE OF GENERAL COUNSEL; F. J. McCARTHY, Jr., ASSISTANT CONTROLLER FOR BUDGETS

Dr. LIBBY. I have a statement which I would like to present, which I hope will be responsive to the Chairman's questions.

Representative COLE. Mr. Chairman, I just want to make sure that the hearings are going to pursue the line you have suggested—that the Commission first discuss the interpretation of the act. Is your statement responsive to that?

Dr. LIBBY. I hope the statement will be considered to be so.

Mr. FIELDS. It will not be completely responsive to that question, sir. I would suggest, if it is acceptable to you, Mr. Chairman, Dr. Libby make his opening statement, which is not too long, and then address ourselves to the questions that you raised. Would that be acceptable, sir?

Representative HOLIFIELD. You may proceed.

Dr. LIBBY. This is the Atomic Energy Commission's first appearance before your committee for the purpose of discussing a requested appropriation authorization. As you know, the Atomic Energy Act of 1946, which governed such matters in previous years, provided continuing authority for all of our appropriation requirements. Under the Atomic Energy Act of 1954, however, specific legislative authority is now required for appropriations covering the Commission's requirement of a capital nature. The recommendation of all such legislation to the Congress is, of course, the responsibility of your Joint Committee. We have come here today at your request to review our proposed 1956 program for plant and equipment acquisition.

GROWTH OF CAPITAL INVESTMENT

Before doing so, however, it would be well to place our 1956 requirements in perspective by reviewing briefly the history and present status of the Commission's farflung plant facilities.

The Commission took over responsibility for the atomic energy program from the Manhattan Engineer District on January 1, 1947, a little more than 8 years ago. Prior to that date Government expenditures on all phases of the atomic-energy program were slightly in excess of $2.2 billion. Two and a half years later, on June 30, 1949, the date of the Commission's first balance sheet, total payments for the atomic-energy program had increased to nearly $3.4 billion.

Of this amount, about $1.9 billion had been invested in plant and equipment and about $1.5 billion had been spent for operating costs, including the purchase of source materials.

During the 5-year period from June 30, 1949, to June 30, 1954, the AEC investment in plant and equipment has trebled, increasing from $1.9 billion to $5.7 billion. By the end of the current fiscal year our plant investment will have increased an additional $0.9 billion to $6.6 billion.

The previously approved plant expansion program is now almost finished. To complete our major production facilities and other authorized projects for which funds have already been appropriated, we anticipate that costs to be incurred in fiscal year 1956 for plant and equipment will amount to about $0.4 billion, and that about $0.3 billion will be incurred in subsequent years. Completion of this work which has already been authorized will raise the Commission's plant investment to $7.3 billion.

	Billions
Completed plant June 30, 1954	$4.1
Construction work in progress June 30, 1954	1.6
Total plant investment June 30, 1954	5.7
Costs to be incurred:	
Fiscal year 1955	.9
Fiscal year 1956	.4
After	.3
Subtotal	1.6
Total plant investment after completion of projects already authorized	7.3

PRESENT STATUS OF PLANT FACILITIES

The greater part of the funds invested in plant facilities during these recent years has gone to provide capacity for production of the key nuclear materials which are the foundation of our atomic-energy program. While a good deal of work remains to be completed at 2 or 3 sites, most of the authorized capacity is already in production, or will be started up within a few months. When all are in full operation we anticipate that our budgeted operating costs will be about $1.9 billion per year. These budgeted costs exclude depreciation, projected at about $0.4 billion annually.

Let me review briefly what an important part these additional facilities play in our total capability. In 1949 our gaseous diffusion plants for the separation of uranium 235 consisted of the K–25 and K–27 plants at Oak Ridge. Today we have, in addition, 3 more plants at Oak Ridge and 4 at Paducah. At our third diffusion plant installation, at Portsmouth, Ohio, several units are already on-stream and the remaining units will be starting up from month to month until the entire plant is in operation.

To the 3 original graphite reactors at Hanford in 1949, 5 improved reactors have been added which increase our plutonium capacity many times over. In addition, the very large Savannah River plant has been built, providing five heavy water reactors capable of producing plutonium and other materials for weapons and reactors.

In 1949 plans had not yet been conceived for such key installations as the Feed Materials Production Center at Fernald, Ohio, the Rocky Flats plant in Colorado, and the heavy water plant at Dana, Ind.

Turning now to research and development facilities, we find that the amounts invested in plant and equipment for these purposes during recent years have been much smaller, but nevertheless significant. Our major laboratories have been provided with needed permanent buildings, and with such major research instruments as the Brookhaven cosmotron and the Berkeley bevatron. New sites required for experimental projects have been acquired. At the end of fiscal year 1949, for example, the Commission had not yet taken possession of the desert expanse in Idaho chosen for the National Reactor Testing Station. Today this installation has become a thriving experimental center, where 3 reactors have been in operation for 2 years or more, and other prototype reactors are now under construction. Similarly, at our other experimental reactor site, West Milton, N. Y., preliminary site development had barely begun at the end of 1949. Today, the land prototype of the Submarine Intermediate Reactor is being made ready for testing at that site.

In 1949, such important installations as the Nevada test site and the Livermore Laboratory had not reached even the planning stage. Many other important additions to our physical plant could be mentioned, but enough has been said to indicate how much more scope, balance, and versatility has been provided in these years. Our capital plant is a major bulwark of the Nation's security. Upon completion of the additions already authorized and those now proposed, our plant facilities will provide a strong, flexible basis, both for maintaining our military security and for pressing forward with the development of the peaceful aspects of atomic energy.

ROLE OF THE JOINT COMMITTEE

In this expansion of the Commission's facilities, the Joint Committee has played a key role. In appropriating the necessary funds, the Congress has looked to this committee for assurance, both as to the need for the greater productive capacity and as to the appropriateness of specific projects. The committee's farsightedness over the years in urging and supporting the bold expansion of the atomic energy program should be gratefully acknowledged by the people of America and the whole free world.

ENTIRE CAPITAL REQUIREMENTS COVERED

The proposed legislation which we are asking the Joint Committee to recommend to the Congress would authorize all construction projects and equipment purchases which the Commission plans to start or initiate in fiscal year 1956. By including in the authorization all projects to be financed from our 1956 plant and equipment appropriation, we have gone beyond what is required by section 261 of the Atomic Energy Act. We see a long-run advantage, however, in obtaining authorization for our entire capital requirements, rather than attempting to segregate those items expected to involve the acquisition or expansion of real property and facilities.

As you know, budgeting and accounting for the atomic energy program is on a cost performance basis. In our accounting, the distinctions drawn between operating expenses, on the one hand, and capital additions of plant and equipment on the other, are based on generally accepted principles which have been evolved over the years for industrial accounting. A great deal of effort has gone into the adaptation of our industrial-type accounting system to the present appropriation structure, in which separate appropriations are provided for operating expenses and for plant and equipment. Inclusion of our entire plant and equipment requirement in the appropriation authorization avoids the introduction of new complexity into our appropriation structure and assures that our related accounting procedures do not become unwieldy and more costly.

NEED FOR FLEXIBILITY

In prior years, the language of the appropriation act did not permit the start of construction unless a specific project had been provided for in the budget. The Commission was able, however, to minimize delays by proceeding with architect-engineer and design work so that construction could be started immediately upon the enactment of appropriations for such construction.

The language in the 1955 appropriation act which permits the substitution of projects for those specifically shown in the budget, was inserted by the House Appropriations Committee. They recognized that in the atomic energy program, circumstances would arise under which the Commission should have authority to proceed with an urgent project even though no specific provision had been made for it in the budget.

In submitting the draft of a bill to authorize appropriations for plant and equipment in the form which you have before you, the Commission had in mind that the language of future appropriations acts would include essentially the same provisions which are now contained in the 1955 act.

These provisions, as you know, make it possible for the Commission to start projects not included in the budget if they are substitutes for budgeted projects, and to start a construction project if its currently estimated cost does not exceed the amount in the budget by more than 35 percent and if funds are available to complete the project or parts of the project to be started.

In view of the developments which are occurring day by day in the program, particularly in the weapons and reactor fields, the Commission feels it is most essential that the flexibility we now have be continued.

AMOUNT OF REQUEST

The Commission is now requesting the authorization of appropriations for plant and equipment in the amount of $293,750,000. This is an increase of $51,250,000 over the original request submitted in January of $242,500,000. The additional amount, for the most part, represents increased requirements for expansion of our reactor development effort.

It should be noted in passing that the amount of obligational authority required for fiscal year 1956 is less than the appropriation

authorization we are requesting today. The difference results mainly from the fact that a part of the funds for certain of the projects covered in the authorization request are not required until after 1956.

SAVINGS DECLARED IN 1955

During the past year, as work has neared completion on some of our large construction projects, we have been able to determine that not all the funds originally earmarked for these purposes would be needed. In other instances, it was found possible to meet program objectives by substituting plant projects of lesser scope than those included in last year's budget. Still other projects could be curtailed or postponed. The result has been that substantial savings have been declared from our plant and equipment appropriation. The unobligated funds being carried forward have made unnecessary any new appropriation for plant and equipment in 1956. In fact, nearly $221 million is available for application against our 1956 requirements for operating expenses.

NATURE OF PROPOSED PROJECTS

The committee has been provided with information concerning each of the 45 projects making up our request. Examination of the list will show that for the first time, the proposed additions to capital plant are predominantly for research and development work, rather than for expansion of production capacity. Furthermore, a considerable proportion of the total authorization is requested for projects directed to peaceful uses of atomic energy.

The hearings before your committee in February on the growth and development of the atomic energy industry emphasized the expanding effort by both industry and Government in the development of nuclear reactors for the generation of electric power. There is general agreement that vigorous efforts should be made to speed up this work. We propose to do so in several ways.

First of all, we are continuing to push forward the development work by AEC laboratories on the 5 reactor systems making up the 5-year program presented to your committee a year ago. In this connection, our requested authorization includes nearly $15 million for a pilot plant to carry out the next steps in developing a fast power breeder reactor. Development work next year on the other four reactor types will be continued with operating funds.

While planning to speed up the work on these and other promising reactor concepts, we have at the same time, in line with the new provisions of the Atomic Energy Act of 1954, invited proposals from industry to develop, build, and operate civilian power reactors with private capital. The proposals thus far received indicate that industry is willing to participate on this basis. The arrangements which may be concluded pursuant to any of these or subsequent proposals will include provision of various kinds of assistance and materials by the Commission. Depending on our appraisal of the opportunities and benefits offered by alternative courses, capital contributions by the Commission may be advisable, or additional AEC facilities may be required for assistance in specialized tasks. Such tasks might include critical assembly experiments, recovery of

uranium from special alloys, or the study of particular metallurgical problems peculiar to a specific reactor design.

To take prompt advantage of the various kinds of opportunities which may arise next year to get on with civilian power reactors, we will need to have funds available. We have included in our plant and equipment authorization request an amount of $25 million. This amount would be available to provide equipment and facilities needed in connection with civilian reactor projects being carried out either by AEC laboratories, by industry, or under joint auspices. We have also included $50 million in our operating expense budget for acceleration of civilian power reactors.

Let me also mention briefly our work on military reactors. Your committee has within recent weeks witnessed at first hand how nuclear power promises to revolutionize the propulsion of naval vessels. Our request includes about $51 million for developing naval reactors.

Another broad phase of our reactor effort is the application of nuclear power to aircraft propulsion. In terms of operating costs, this effort moves to the forefront of our entire reactor program next year, and the amount for developmental facilities included in our authorization request can be expected to be larger in subsequent years.

From these comments it will not come as a surprise that 43 percent of our requested authorization is for reactor development projects. Roughly 23 percent of the total is concerned with projects related to the development, production, and storage of weapons, and about 12 percent is related to the production of source and special nuclear materials. Miscellaneous minor plant projects and proposed equipment purchases comprise another 16 percent. Relatively small amounts comprising about 6 percent of the total are proposed for additional physical research and biology and medicine facilities. The latter would provide badly needed facilities for the medical research center at Brookhaven National Laboratory, including a reactor specifically designed for medical use.

I shall now ask the General Manager and staff to furnish any additional information the committee may desire concerning the individual projects covered by the authorization request.

Representative HOLIFIELD. Thank you, Mr. Libby.

At this point we will include in the record, if there is no objection, a letter from Acting Chairman Libby, dated March 30, 1955, addressed to Senator Anderson, in regard to the draft of the bill and the revised analysis of the bill.

We will also have printed at this point the draft of the bill.

Mr. FIELDS. Could I request, with your permission, to also insert in the record the previous letters which are dated January 20, which went to the Speaker of the House and the President of the Senate, and a similar letter to Senator Anderson at that time?

Representative HOLIFIELD. Without objection those letters will be inserted in the record.

Mr. FIELDS. I have copies of them here, if the reporter would like to have them.

Representative HOLIFIELD. Also a letter from Vice Chairman Hickenlooper to the Chairman of the Commission, Mr. Strauss, under date of November 19, 1954, in regard to the meaning of section 261 of Public Law 703. That will also be printed at this point in the record.

(The letters and bill referred to follow:)

UNITED STATES ATOMIC ENERGY COMMISSION,
Washington 25, D. C., March 30, 1955.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR SENATOR ANDERSON: On January 20, 1955, we transmitted to the President of the Senate and the Speaker of the House a draft of a bill (with an accompanying analysis) which would authorize appropriatons to the Atomic Energy Commission for its fiscal year 1956 plant and equipment program in accordance with the provisions of section 261 of the Atomic Energy Act of 1954. With our letter of the same date, we transmitted to your committee the details of the program to be covered by the appropriations for which authorization was requested. The amount of authorization as noted in that draft was $242,500,000.

As a result of a midyear review of our fiscal year 1955 budget program, we can now project additional savings in current year funds. This review also disclosed certain urgent items which should be included in our fiscal year 1956 budget program and which will necessitate changes in the President's budget submitted to the Congress in January. In order to reflect the changes in the Commission's plant and equipment program, resulting from these reviews, we request that the amount of $242,500,000, included in the draft of authorizing legislation submitted on January 20, 1955, be amended to provide for a total authorization of $293 750,000. To facilitate your consideration of our total requirements, there are attached a revised draft and revised analysis of the bill which include the new items. It is requested that this material be substituted for the proposal which we transmitted to you on January 20, 1955.

The Bureau of the Budget has advised us that enactment of the legislation as revised would be in accord with the program of the President.

Sincerely yours,

W. F. LIBBY,
Acting Chairman.

AN ACT To authorize appropriations for plant and equipment, including acquisition or condemnation of real property or facilities, and plant or facility acquisition, construction, or expansion, for the atomic energy program

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. There is hereby authorized to be appropriated to the Atomic Energy Commission the sum of $293,750,000 for plant and equipment, including the acquisition or condemnation of any real property or any facility, and plant or facility acquisition, construction, or expansion necessary in carrying out the purposes of the Atomic Energy Act of 1954.

JANUARY 20, 1955

Hon. SAM RAYBURN,
Speaker of the House of Representatives.

DEAR MR. SPEAKER: There is transmitted herewith, in accordance with the provisions of section 261 of the Atomic Energy Act of 1954 (Public Law 703, 83d Cong.), proposed legislation which would authorize appropriations to be made to the Atomic Energy Commission for the purposes of acquisition or condemnation of real property or facilities or for plant or for facility acquisition, construction, or expansion. The Bureau of the Budget has advised us that enactment of this legislation would be in accord with the program of the President.

The total amount for which authorization is proposed is $242.5 million. The details of the various items have been transmitted to the Joint Committee on Atomic Energy.

Although authorization legislation will be required by the Atomic Energy Act, no new money will be required to be appropriated by the Congress since obligations to be incurred in fiscal year 1956 against items authorized can be met from the balance of prior-year appropriations to the Commission which will be unobligated on June 30, 1955.

We would appreciate your earliest possible action on the attached legislation.

Sincerely yours,

LEWIS L. STRAUSS, *Chairman.*

JANUARY 20, 1955.

Hon. RICHARD M. NIXON,
President of the Senate.

DEAR MR. PRESIDENT: There is transmitted herewith, in accordance with the provisions of section 261 of the Atomic Energy Act of 1954 (Public Law 703, 83d Cong.), proposed legislation which would authorize appropriations to be made to the Atomic Energy Commission for the purposes of acquisition or condemnation of real property or facilities or for plant or for facility acquisition, construction, or expansion. The Bureau of the Budget has advised us that enactment of this legislation would be in accord with the program of the President.

The total amount for which authorization is proposed is $242.5 million. The details of the various items have been transmitted to the Joint Committee on Atomic Energy.

Although authorization legislation will be required by the Atomic Energy Act, no new money will be required to be appropriated by the Congress since obligations to be incurred in fiscal year 1956 against items authorized can be met from the balance of prior-year appropriations to the Commission which will be unobligated on June 30, 1955.

We would appreciate your earliest possible action on the attached legislation.

Sincerely yours,

LEWIS L. STRAUSS, *Chairman.*

JANUARY 20, 1955.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR SENATOR ANDERSON: There are attached copies of letters to the President of the Senate and the Speaker of the House, transmitting proposed legislation, in accordance with the provisions of section 261 of the Atomic Energy Act of 1954 (Public Law 703, 83d Cong.), which would authorize appropriations to be made to the Atomic Energy Commission for the purposes of acquisition or condemnation of real property or facilities or for plant or for facility acquisition, construction, or expansion.

As we view the exceptions in section 261 of the Atomic Energy Act of 1954, only appropriations for the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion require authorization. As a practical matter, however, because of the difficulty of determining which kind of projects fall within the scope of the exceptions and which are exempt from it, and in order to maintain our present budget structure and system of accounts, we have included in the proposed legislation an authorization for all items covered by our "Plant and equipment" appropriation. In connection with two items, authorization for the total cost of the projects is being requested although a portion of the funds will not be requested until a later year.

Further, as you know, the Commission's fiscal, accounting, and budgeting procedures are based on industrial practices. As a result of this our budget is broken down into those outlays which are expensed and those outlays which are capitalized. We have at the present time two appropriations, one being the appropriation for "Operating expenses" and the other covering our capital outlays and designated as the "Plant and equipment" appropriation. Since the requirement for authorizing legislation will necessitate for the fiscal year 1956 the transmittal of a supplemental appropriation request after the submission of the regular budget in order to cover those items for which authorization is required, our proposal would have the merit of providing for the coverage of all plant and equipment items in the one supplemental request, thereby maintaining the present division in appropriations. We feel that this approach would also prove less confusing in the authorizing and appropriating processes.

The total amount for which authorization is proposed is $242.5 million. The details of the various items are set forth in the analysis of the proposed legislation attached hereto.

Although authorization legislation will be required by the Atomic Energy Act, no new money will be required to be appropriated by the Congress since obligations to be incurred in fiscal year 1956 against items authorized can be met from the balance of prior-year appropriations to the Commission which will be unobligated on June 30, 1955.

We would appreciate your earliest possible action on the attached legislation.

Sincerely yours,

LEWIS L. STRAUSS, *Chairman.*

NOVEMBER 19, 1954.

Mr. LEWIS L. STRAUSS,
Chairman, Atomic Energy Commission,
Washington 25, D. C.

DEAR MR. STRAUSS: Section 261 of Public Law 703 reads in part:

"There are hereby authorized to be appropriated such sums as may be necessary and appropriate to carry out the provisions and purposes of this act except such as may be necessary for acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion."

The committee desires to initiate plans for handling the authorization legislation required by the above, in order that hearings may be held and the legislation process begun as soon after the convening of the 84th Congress as is possible.

It would be greatly appreciated therefore if the AEC would inform the committee at the earliest time possible as to how the AEC proposes to initiate requests for authorization legislation, together with the AEC's views on the legal scope of the exception clause.

Sincerely yours,

BOURKE B. HICKENLOOPER, *Vice Chairman.*

Representative HOLIFIELD. Before General Fields proceeds, are there any questions by members of the committee of Mr. Libby at this point?

Representative COLE. Mr. Chairman, I do not understand the Commission's viewpoint with respect to its obligations under section 261 to obtain an authorization for appropriation funds for construction purposes.

I judge from Dr. Libby's statement that you have said you are seeking authorization for appropriations far and above that required by section 261, but I still do not understand wherein that is true, if it is true as to my understanding that the total sum of $293 million represents construction costs.

Dr. LIBBY. It represents that, plus everything that we can see as conceivably falling in the definition of "plant, equipment, facility."

I think that is a correct statement; is it not, Mr. Fields?

Mr. FIELDS. At this——

Representative COLE. You do not think that section 261 covers plants, facilities, and equipment, and so forth?

Dr. LIBBY. Yes, sir.

Mr. FIELDS. At this point, Mr. Cole, I wonder if we could give you our interpretation of section 261 of the act.

Representative COLE. That is what we asked for last November, and I am happy that you are now asking permission to submit it.

Mr. FIELDS. Yes, sir. We would hope at this point we could be responsive to that question, and I would ask general counsel to take that one on at this stage, Mr. Mitchell.

Representative COLE. He seems to be eagerly sitting on the edge of his chair.

Representative HOLIFIELD. At this point, General Fields, as this is your first official appearance before us as the new General Manager, the subcommittee wishes to welcome you and wish you well in your duties which you will have to take on, I understand, as General Manager.

Mr. FIELDS. Thank you. I look forward to working with your subcommittee and with the committee.

Representative HOLIFIELD. Mr. Mitchell, did you wish to respond now?

Just a minute please. Congressman Durham.

Representative DURHAM. Before we get into that. Dr. Libby, this $25 million, I understand you are asking for it more or less as an item to use when these projects come up that you feel are necessary to complete?

Dr. LIBBY. Yes, sir.

Representative DURHAM. In other words, you request this $25 million in here as a kind of a fund that you can use at any time for plant expansion?

Dr. LIBBY. For plant and equipment in the civilian power reactor program; yes, sir.

Representative DURHAM. Your statement was that it primarily concerned reactors?

Dr. LIBBY. Yes, sir.

Representative DURHAM. In doing that, Mr. Chairman, I think it would be wise to have a statement on this reactor development program put into the record, because, even though those funds are used under the law, if we give you the authority and Appropriations give you authority to use this as such a fund, you will have to come back to the committee and report every item.

Representative PRICE. Along that line, if you will yield.

Representative DURHAM. Yes.

Representative PRICE. May I state that the Research and Development Subcommittee has recently obtained a complete report from the Commission on the reactor development program, and it will soon be in printed form for every member of the committee and for the public.

Representative DURHAM. That is a policy that we lay down?

Representative PRICE. Yes.

Representative DURHAM. That is what I was thinking of, because $25 million is a pretty good sized sum to request of Appropriations unless we can convince them that we have got a pretty good policy laid down here for the use of this money, because I do not think we would get very far otherwise.

Representative PRICE. Before we wait another 6 months for the Commission's interpretation of section 261——

Representative COLE. Mr. Chairman?

Representative HOLIFIELD. Yes; Mr. Cole.

Representative COLE. Before we get away from this, there is another angle. I would like to find out if the Reactor Subcommittee is going to be the one that will pass on the authorization of appropriations for the reactor program.

Representative PRICE. No.

Representative COLE. I understood from your answer to Mr. Durham that it was.

Representative PRICE. He was inquiring as to policy.

Representative COLE. That is what I am talking about—policy with respect to authorization.

Representative HOLIFIELD. I particularly asked members of the Subcommittee on Research and Development to sit in with us this morning because I know they have been investigating this one phase, in order that we might have the benefit of their knowledge and advice; and if this statement has been prepared, as you say, there would be no objection to having it filed in our final hearings, would there, Mr. Price?

Representative PRICE. It would be duplication if we filed the same thing in two committees.

Representative DURHAM. I just wanted a short statement by the Commission, because this $25 million is something they will have to act on at a future date, as to the use of it.

Representative HOLIFIELD. Are you prepared to give us a general statement on that $25 million this morning?

Mr. FIELDS. Yes, sir.

Representative HOLIFIELD. As to how you have it allocated?

Mr. FIELDS. Yes; how we would intend to use it.

Representative HOLIFIELD. That would come up as we take this up item by item?

Mr. FIELDS. Yes.

Representative HOLIFIELD. Will you withhold, Mr. Durham, until we get to that?

Representative DURHAM. That will come from the General Manager, but the $25 million will be acted upon by the Commission at a later date, with no specific items in it, and I would like a statement direct from the Commission. If your statement is from the Commission as General Manager, I suppose it would be all right. I suppose it would be from the Commission.

Mr. FIELDS. I think it would be.

Dr. LIBBY. Yes; it is. However, if you would like to discuss it, we would be glad to.

Mr. FIELDS. We had intended to state, in the course of reviewing these items, what we would intend to do with the $25 million.

Representative DURHAM. What I am getting at is this, Mr. Fields: We do not know from this statement whether you are going to put up 10 percent for somebody to build a reactor in Oshkosh, or down in my section you are going to put up 5 or 2 percent. I think we should have a pretty clear, definite statement as to how far we are going to participate with private enterprise in the development of reactors as far as funds are concerned.

Mr. FIELDS. Yes, sir.

Representative DURHAM. You could use 50 percent or 75 percent under your authorization, or 25 percent.

Mr. FIELDS. We would hope that we would have that flexibility. It is a contingency item and an item on which we feel we should have the flexibility. With the acceleration of the reactor program that is intended here, we feel there will be projects coming along which for one reason or another, perhaps, industry will not want to push.

Representative DURHAM. When we participate jointly with a State or organization, we usually write a formula of 25 percent or 65 or 75 percent by the Federal Government. Could you give us a formula?

Mr. FIELDS. I think we would find it very difficult to do so at this stage, not knowing all the types of proposals that will be received for participation by industry or others in this program at this point.

Representative HOLIFIELD. What you are essentially asking for, as I understand it, Mr. Libby and General Fields, is a floating fund of $25 million which, as the different reactor programs are developed, you may assign on the judgment of the Commission such amounts as you feel will be necessary for each one of these reactor programs. Is that right?

Dr. LIBBY. Yes, sir.

Representative HOLIFIELD. Would that also include any new reactor programs which might be established?

Mr. FIELDS. It may be a type would come along which we would find should be pushed for the reason perhaps that industry is not ready to pick it up. Perhaps it is a program on which a lot still needs to be done on the development. But we would hope that if such a thing comes along—and one might be such a thing as a 10,000 kilowatt sort of reactor which might be in a field where something like rural electrification would be greatly interested, or foreign export—a specific reactor might come along during this period that we might want to launch during the next fiscal year.

Representative DURHAM. Jointly with some industry?

Mr. FIELDS. We would hope it would be jointly with industry. We would attempt to make it jointly, yes, sir.

Representative DURHAM. That is another thing you are getting into. Are you going to finance completely new ideas of prototypes of reactors by some industry?

Mr. FIELDS. We might if one looked attractive and promising, sir. We would hope we would have the authority to do so.

Representative DURHAM. I hope before we finalize this thing you people come up here and see if you cannot give us a formula of 10 percent, 25 percent, so we will have something definite to go on, and not get into the position of where some individual in some part of America is going to claim he has just as good an idea as the other fellow up in another section and you have got one formula for the one and one for the other.

Mr. MURRAY. May I say one word to that?

Representative DURHAM. Yes.

Mr. MURRAY. As the general has indicated, it may be very difficult to reach any definite formula in relation to this reactor development. Let me point up just one instance.

We have had several proposals for industry to explore certain avenues of approach to economic industrial power. There was no proposal, for example, to investigate the homogeneous reactor. None whatever. We may find it necessary to support that entire project, or we may have to support 80 percent of it; but it is an avenue of approach that must be explored. And in this phase that we are now in at the moment, it would be very difficult to say that 10 percent or 20 percent is all you are going to appropriate for any particular type of reactor.

After a year or so you may be able to get into the position that you indicate. However, I am not anticipating after this year, Mr. Durham, we will be having to support industry for reactors.

Representative DURHAM. That would not preclude you from going out and exploring it in your own laboratory and building your own reactor. You have the funds to do that.

What I am trying to differentiate is this $25 million you have here where you can go out in an industry-participation program. That is what you plan to use it for.

Mr. MURRAY. That is right.

Mr. FIELDS. We might plan to use it also in our own laboratories or own development projects.

Mr. MURRAY. It is not tied down just to industry.

Representative DURHAM. This certainly would not preclude you, because it would not affect you, but where you are participating with some individual on a project——

Mr. MURRAY. This fund includes both.

Representative HOLIFIELD. Mr. Durham, I suggest the whole breakdown of the reactor development is on pages 2 and 3, and let us reserve this discussion until we reach that point in the presentation and get back now to Mr. Cole's request that legal counsel give us an interpretation of their understanding of section 261, if we may.

Mr. Mitchell, I believe you were seeking recognition, or Mr. Fields was for you. Is that right?

Mr. FIELDS. That is correct.

Mr. MITCHELL. Very well.

The critical words I think are:

except such as may be necessary for acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction, or expansion.

Our feeling is that the word that gives us the greatest difficulty here is "facility."

In the first part of this phrase we feel that "facility" must be read in the context of "acquisition or condemnation of real property"; and in the second part in the context of "acquisition, construction, or expansion of plant."

So our feeling is that "facility" within the context of 261 means a substantial addition or alteration either to real estate or to plant, and we feel that the legislative history of 261 bears this out.

The history of 261 is that in a Joint Committee print of May 21, 1954, the phrase was:

except for such sums as may be necessary for acquisition of real property and plant construction or expansion.

The committee will note at that point the word "facility" does not appear.

Shortly after that the Senate bill changed the exception to read:

except such sums as may be necessary for acquisition or condemnation of real property or for plant construction or expansion.

At that point you will note that the condemnation concept came in. And the report to accompany that bill stated in part:

The Commission is required to obtain congressional approval of new construction or expansion of its plants.

The phrase "facility" appeared for the first time in the conference report of August 1954 and the statement of the House managers in connection with that report, which is dated August 6, 1954, to accompany H. R. 9757 states this:

Since there was no thought that the Commission, in carrying out its obligations under this act should not be required to get congressional approval for its operations, the amendment made by the Senate to section 261 which exempted the Commission from the necessity of obtaining congressional approval for certain construction and acquisition projects was deleted by the conference substitute.

That reference to the Senate amendment had to do with what was then section 45 (a) of the bill: 45 (a) gave the Commission authority to produce or to provide for the production of electric power and other useful forms of energy derived from nuclear fission in its own facilities or in the facilities of other Federal agencies.

At one point the Senate version had an exception with respect to 45 (a) so that, in effect, the Commission would not be required to come back or to obtain authority for this particular type of plant acquisition and construction.

That is the reference as we read it in the report of the House managers.

The only thing we have been able to find in the debates on the floor in either House were two statements by Senator Hickenlooper on July 19, 1954. In discussing the scope of section 261, Senator Hickenlooper said this:

"That"—he was referring to section 261—

That is not necessarily directed at anything except the general attitude of the Appropriations Committees and the other committees, that the agencies of Government should not be given authority to condemn property and buy real estate without coming to Congress with their programs.

The language is not directed necessarily at the Atomic Energy Commission. It indicates the general policy Congress has adopted and which is applicable to all Government agencies—I should not say "all," because there may be some exceptions—that departments and agencies cannot condemn land and undertake massive major construction without submitting the matter to Congress.

On August 13, 1954, Senator Hickenlooper, in discussing the conference report, stated this on the floor of the Senate:

The Commission must * * * obtain specific congressional authorization as well as appropriations for each new plant, construction, or expansion regardless of the type of plant involved.

That is nothing unique. This principle is followed throughout most of the departments of the Government. If the Commission seeks to build new plants, it will have to come to Congress for the money. This provision does not apply uniquely to the Atomic Energy Commission; it is in keeping with policies which have been established for a long time.

To repeat, it is our view that "real estate" or "plant" and "facility" means substantial additions or alterations or improvements to real estate or plants which are intended to be permanent and which by their nature are permanent.

When we say in our statement that we think we have gone beyond this in our request to this committee, we have in mind the fact that those items which we put on the plant and equipment side of our budget include not only such things as, say, a new heating plant, which we would consider to be a facility within the meaning of 261, but also such items as office furniture, dies and tools, and things of that character which we do not consider to be facilities within the meaning of section 261, but which for convenience we thought it appropriate to include in our request.

Mr. COLE. Mr. Chairman?

Representative HOLIFIELD. Mr. Cole.

Representative COLE. Mr. Mitchell, do you use the word "facility" in the same meaning and connotation as the word "plant"?

Mr. MITCHELL. I think not entirely, sir; no. Facility, to my mind, would be a part of a plant which was in the nature of what is known in common law as a fixture which becomes part of the real estate.

Say in a plant we put in a new boiler, associated pipes, heating units, and so on, we would consider that to be a facility, although it is only part of the plant.

Representative COLE. Do you consider an office desk as a facility?

Mr. MITCHELL. No, sir.

Representative COLE. In your explanation a moment ago before I questioned you, you did say that you would consider a heating plant, a heating system, as coming within the meaning of the word "plant."

Mr. MITCHELL. I am sorry if I said that, sir. What I meant to say was as coming within the meaning of 261.

Representative COLE. If so, then it must be construed as a plant, because the word "facility" does not appear in 261.

Representative HOLIFIELD. Yes, it does.

Representative COLE. What is this I am reading from then?

Mr. HAMILTON. You were reading from the first report, sir.

Representative COLE. You do consider a heating system as a facility?

Mr. MITCHELL. If it is a permanent part of the building or the real estate, yes, sir, we would.

Representative COLE. Of course, if it is a kerosene stove you are carrying around, therefore, it is not a permanent part, and that would not be a facility?

Mr. MITCHELL. That is right.

Representative COLE. That is not the kind of heating system I am talking about.

Mr. MITCHELL. Nor am I.

Representative COLE. You would consider a heating system as a facility?

Mr. MITCHELL. Yes, sir; we would.

Representative COLE. As a part of the real estate?

Mr. MITCHELL. That is right.

Representative COLE. I think that is what was intended by that new thought that was included in section 261: If any funds are to be spent for the acquisition of real estate or the construction of real estate or a part of real estate it comes within the requirements of 261.

Mr. MITCHELL. That is our view, sir.

Representative COLE. I judge, then, that your request for $293 million includes costs of desks and personal property within a facility or plant?

Mr. MITCHELL. Yes.

Representative COLE. And therefore is more than is required of you to submit to Congress for authorization?

Mr. MITCHELL. That is right.

Representative COLE. As contained in section 261.

Mr. MITCHELL. Yes, sir.

Representative COLE. By what proportion?

Mr. BURROWS. About $30 million in there for equipment, sir.

Representative COLE. $30 million of the $293 million?

Mr. BURROWS. Yes, sir.

Representative COLE. Is for personal property within the plants?

Mr. BURROWS. That is right. That is equipment of all kinds, sir.

Mr. FIELDS. Process equipment, laboratory equipment, vehicles.

Representative HOLIFIELD. Does that include also research and development funds?

Mr. FIELDS. That would include the laboratory equipment which might go into research and development activities, sir, in laboratories.

Representative HOLIFIELD. But this $25 million item, for instance, would also contain funds for contracting research and development, would it not?

Mr. FIELDS. This is for the plant and equipment part of any activities like that. We have on the operating side $10 million we are requesting in actual costs and $40 million obligational authority that could be exercised during fiscal 1956 for the actual research and development type of activity, or joint operational activity.

Representative HOLIFIELD. That is not included in this?

Mr. FIELDS. That is not included in this.

Representative HOLIFIELD. Mr. Allardice has some questions he wishes to take up.

Mr. ALLARDICE. When we were considering the bill, the Commission presented the committee with a memorandum on the proposal to require authorizing legislation for construction projects of the atomic-energy program, in which the Commission presented its reasons why it did not wish to have this language written in the bill. Included in that memorandum is the following sentence:

> Since the operating expense appropriation in any Commission budget contains funds pertaining to plant for which construction funds are being requested, it might also be necessary to withhold these amounts and possibly the entire operating expense amounts from the President's budget until after the enabling legislation has been enacted.

I point this out to show that in the mind of the Commission at the time we were considering the legislation there was a clear indication of potential intermarriage, or intermingling, between these two phases of budgeting. Now I would like to ask whether or not your operating budget contains any funds for the construction of any plant or facility. Then we can get down to discussing what is plant and facility.

According to the information we have, the operating budget does contain funds for construction of plants or facilities, to wit, the Boiling Water Reactor for $2,210,000; the Homogeneous Reactor, $490,000; and the Sodium Graphite Reactor, $1,698,000.

Now, under what interpretation do you believe you have authority to have appropriated those funds or to spend them?

Dr. LIBBY. Would you like to answer this, Mr. Fields?

Mr. FIELDS. May I ask our controller to answer that point. I believe I could, but perhaps he could give a more straightforward answer.

Mr. BURROWS. These facilities which you refer to are all expendable items. They are facilities which are experiments themselves which have no permanent or lasting value and have no productive or end-use purpose. An experimental reactor is built to see whether it works. Once the small model works, it is then dismantled, it has no further continuing use.

We believe that we are following accepted accounting and industrial practice in this type of research facility in having it expensed rather than charged as a capital or a plant item.

Mr. ALLARDICE. Are you familiar with the definition of a production and utilization facility in the Atomic Energy Act of 1954?

Mr. BURROWS. I am familiar with it, but I think counsel would probably be more familiar.

Mr. MITCHELL. Our thought there was that "production facility" and "utilization facility" are terms of art. They are defined in the statute. When we are looking at 261 we have to look at the term "facility" in context, as used in connection with real estate and plant, which to our mind is something different.

Representative COLE. You do feel the word "facility" in section 261 includes production facility and utilization facility?

Mr. MITCHELL. I do not think they would entirely coincide, Mr. Cole.

Representative COLE. I do not understand how you can reason that, because the word "facility" is much more broad than the words "production facility" or the words "utilization facility." A broader word would include the two lesser classes, I would think.

Mr. MITCHELL. I would think perhaps, sir, particularly as to the utilization facility, there might be something of an experimental nature which is temporary and which Mr. Burrows has indicated we will write off as soon as the experiment is completed, which would not be in the context of permanent acquisition or construction within 261, but which still might fall within the definition of production facility and utilization facility.

Mr. ALLARDICE. Where does the word "permanent" appear in section 261?

Mr. MITCHELL. I do not see it.

Mr. ALLARDICE. I do not see it either.

Mr. MITCHELL. I think you have to look at it in context as to what we understood the Congress was saying to us here, and what help we get in the history of this section, and discussion.

Mr. NORRIS. Where does the word "substantial" appear in 261?

Mr. MITCHELL. I do not see that either.

Mr. NORRIS. And you say you look at 261 in context with the rest of the section.

Mr. MITCHELL. I used the term "substantial" because in a building you may have to go in and replace a valve, for instance. I would not consider that to be an expansion or acquisition; that comes in the nature of ordinary repair.

Mr. NORRIS. I am wondering why you do not look at the word "facility" in context with the rest of the act.

Mr. MITCHELL. I am trying to look at it in context with this particular section.

Mr. BURROWS. If I may add a word. These facilities which we are speaking of are really development efforts rather than construction. These things are being designed and developed as we go along for the purpose of seeing whether they will work, and that is the only purpose for which they are put up.

I should also add that, if they are housed in a building which would have more of a permanent or of a capital nature, we do place the building in the authorization request. It is the cost of the experiment itself which is exempted.

Mr. NORRIS. Mr. Mitchell, have you read Report 424 made by this committee on H. R. 5645?

Mr. MITCHELL. I have not read it recently.

Mr. NORRIS. May I draw to your attention, on page 4, the language in the parentheses just before the changes in existing laws, at the bottom of the analysis of the bill, the last two sentences:

> In specifying the additional items which the Commission would be authorized to construct, it was meant to include such things as small adjacent service buildings, garage, guard house, and so forth; and then in parentheses the word "facility" is not used in this specification of additional items, since throughout the Atomic Energy Act of 1954 the word "facility" has a special meaning covering both production facilities and utilization facilities.

Mr. MITCHELL. I take it what the committee was saying was that they were not using the other definition of facility in this context, that is why they had not used the term.

Representative HOLIFIELD. Mr. Durham.

Representative DURHAM. Mr. Mitchell, under this procedure, looking back over the development of this program—I am just suggesting this—of course, we have built all of these facilities not knowing whether or not they were going to work, and most of them or many of them are still in operation today. This thing could get to a point where there would not be many facilities you would have to come up here to get authorization for, as I see it, because I think you are not just talking about a little baby thing here. Look at the materials testing reactor. That is an example, and it is still working today. The prototype submarine reactor is still working.

Mr. FIELDS. Both items are carried in the plant and equipment section of our budget.

Representative DURHAM. I was thinking of the Materials Testing Reactor.

Mr. FIELDS. We carried that in the plant and equipment appropriations.

Representative DURHAM. I was just thinking of what could happen under this.

Mr. ALLARDICE. On the point that Mr. Durham has raised, your 1953 independent offices appropriations defense includes the following sentence:

> Of the 1953 budget estimate about $38.9 million is for construction of experimental and prototype reactors and pilot plants required to confirm the fundamental and basic data being developed by our laboratories and contractors. Such confirmation is without question essential background for the development of improved future reactors and chemical plants.

Would it be correct to say that under your present reasoning today you would include these in the operating budget?

Mr. FIELDS. It would be correct.

Mr. ALLARDICE. There has been a change in your policy?

Mr. FIELDS. I do not believe there has been a change in our policy, in that we would think of the materials testing reactor in the same framework at the present time.

Mr. ALLARDICE. How about the $38.9 million that you talked about in 1953 which was under "Plant and equipment"? Would that be under "Plant and equipment" today?

Mr. FIELDS. I am not familiar with that.

Mr. BURROWS. It is the same. We are following the practice we have been following for 3 or 4 years.

Mr. ALLARDICE. Why is the construction money, then, for the boiling water reactor, the homogeneous reactor, and the sodium graphite reactor in the operating budget and not in the plant and equipment authorizing budget?

Mr. FIELDS. Because of their temporary nature, and they are research and development projects. They will not have a long lifetime. Once a process is proved, it leads in certain cases, like in the homogeneous reactor, to a specific proposal for such a prototype, which would then be in plant and equipment authorization request.

Mr. ALLARDICE. These, you say, then, are transitory stages in the development?

Mr. FIELDS. That is correct.

Mr. ALLARDICE. Referring to Dr. Libby's statement, I would like to pick out one or two sentences in his statement. He says, on page 10.

> Development work next year on the other four reactor types will be continued with operating funds.

I presume that is what you are referring to in the point that I have raised on the operating budget.

Mr. FIELDS. That is correct.

Mr. ALLARDICE. On page 11, he says:

> We have also included $50 million in our operating expense budget for acceleration of civilian power reactors.

Now, part of that $50 million, then, would be for similar construction?

Mr. FIELDS. It might be for auxiliaries, or use in joint auspices projects.

If you will recall, I said of that $50 million, $10 million would be for costs in 1956 and 40 would be obligational authority for exercise during that year.

Mr. ALLARDICE. In the next paragraph on page 11, he says:

> Our request includes about $51 million for development naval reactors.

Now this is development that is under "Plant and equipment," and the other is development that is under "Operating." How do you decide this?

Mr. FIELDS. The $51 million that he refers to is for projects which are essentially prototypes of reactors for the large ship reactor and for the advanced submarine reactor. They are a stage beyond.

Mr. ALLARDICE. Are they temporary?

Mr. FIELDS. They probably will not have a long life in the sense that the actual model that is put into the ship or submarine would have. They are the sort of reactor that is now operating at the National Reactor Test Station. They would be operating for a number of years.

Mr. BURROWS. That is right. We foresee continued operation of those reactors. These other reactors we are speaking about, we do not foresee any continued operation.

Dr. LIBBY. Perhaps 2 or 3 examples of reactors which have actually been built and then dismantled would help.

We have the HRE No. 1, operated for a while and stopped; torn down; and now we are going to put in another one.

We have the aircraft reactor experiment which went along last fall for a few weeks, and then was stopped, and torn down.

We have the Geneva Conference reactor, which will operate for 20 days or something like that, for some time, and then be dismantled, disposed of.

This kind of a thing is a transitory, short-lived type of apparatus, experiment.

The submarine prototype at Arco is a much longer life thing. We seem to be able to draw the distinction in our minds. It is perhaps a little vague just what the principles are.

Representative COLE. Mr. Chairman, it seems to me the interpretation the Commission has placed on the limitation in 261 is a reasonable interpretation and reasonably complies with the intent of the committee and Congress when it wrote the exception. I am satisfied.

Representative HOLIFIELD. Mr. Durham, do you feel as well satisfied as apparently Mr. Cole does?

Representative DURHAM. I am not raising any particular question about it, except I do not see much difference in this and the NACA. Many things they built they did not know whether they were going to work or not, and they had to come for authorization to the Congress. I think that is what we are going to face eventually. I think it is something we can correct if it does not work. I am willing to try it.

I do feel that when you get into these expenditures of millions of dollars, and with the cry and everything we hear about expenditures, that Congress should have the authority to authorize them. I think that was the intent, whatever construction you want to put on the word "facility." But I see very little difference in the NACA and this operation, because it is primarily a research project, where you start out and put one thing in, and add bricks and mortar, and you have a facility.

Representative HOLIFIELD. I am inclined to believe there is quite a difference between these reactors that are of temporary nature and those such as the Arco reactor which we planned to get information from over a long period of time. How you draw the borderline between capital plant and investment and experimental reactor is, of course, a matter of judgment.

The main concern of the committee, however, I think is to have some knowledge and control of large expenditures of money, which we feel should be possible according to a formula presented to us in advance wherever it is possible. We would not want to see you come in with a short-time experimental or development plant which would still run up into a great sum of money and have you go ahead and do this without some consultation with the committee. Whether that consultation should be in your formal presentation or not, I am not in a position to say personally.

Mr. FIELDS. It would certainly be our intent to keep you fully and currently informed, and, of course, we do this on the program periodically, as the review with the Reactor Subcommittee.

Representative HOLIFIELD. Of course, that is the law that you should keep us currently informed.

Mr. FIELDS. Yes, sir.

Representative HOLIFIELD. When we get into these big items running $40 million and $50 million we think we should be informed before the decision is made as well as after you have made it.

I think we can leave this one point at the present time, because it is getting along and we have to get to these items in the budget.

Mr. Allardice has one more question he wants to ask.

Mr. ALLARDICE. On page 6, you stated:

> The proposed legislation which we are asking the Joint Committee to recommend to the Congress would authorize all construction projects and equipment purchases which the Commission plans to start or initiate in fiscal year 1956.

Now, with the understanding as you have said here today that the construction items in the operating budget are not of a type that would be carried as a capital asset, is this statement absolutely accurate?

Dr. LIBBY. I believe so.

Mr. ALLARDICE. Do you feel, then, that you have authority to expend money for construction of a proposed plant regardless of cost under a previous appropriation?

Mr. FIELDS. If it was authorized in the previous act.

Mr. ALLARDICE. Let me put it this way: When does the substitute language of the last bill run out, the last appropriation bill run out? At what time can you cease to apply substitutions?

Mr. BURROWS. If we had specific projects in the budget last year and those projects had not yet been started, and we wished to substitute a new project for one that has not started, we believe we would have the authority to do so.

Mr. ALLARDICE. Then this statement is not correct?

Mr. BURROWS. But this refers to projects which we will start for the first time which had not been previously authorized.

Mr. ALLARDICE. Are there any programs in your last year's appropriation which are not started already?

Mr. MCCARTHY. I believe there are some; yes.

Mr. ALLARDICE. In other words, those could be substituted then under the previous language. Is that in accord with the GAO's letter?

Mr. FIELDS. I would think we could, but I perhaps should check on this.

Mr. ALLARDICE. Does not the GAO's letter say that ends at the end of fiscal year 1955?

Mr. FIELDS. As we have stated previously, the language we have proposed was proposed on the assumption that the substitution authority and the other riders that were previously in the bills would probably follow for the fiscal year 1956 operation.

Mr. ALLARDICE. This you do not know, however.

Mr. FIELDS. We would hope that we would have these same authorities.

Mr. ALLARDICE. You undertook a rather large expansion of your feed materials program, roughly $69 million, under substitute language, did you not?

Mr. FIELDS. That is correct, under the substitute language.

Mr. ALLARDICE. On March 4, the Comptroller General—and we believe a copy of this letter was provided to the Commission—wrote regarding our request for an interpretation of the effect of the word "substitute." I think the key sentence is the following:

> Since the substituted facilities are needed to meet the revised product requirements and, in effect, serve the end purpose in the same manner as the original facilities would have done, we believe that the substituted facilities which comprise the feed materials program are a substitute within the meaning of the word as used in the 1955 appropriation "Plant and equipment."

You would say, if the substitute language is left in your appropriation language, you still could start or initiate a substitute facility or plant which is not authorized by a specific act?

Mr. FIELDS. Which is not included in the budget itself; that is correct.

Mr. ALLARDICE. Or included in the authorizing legislation passed by this committee?

Mr. FIELDS. Or included in the authorizing legislation, providing the same riders obtain on 1956.

Representative DURHAM. That is right—providing the same riders obtain. If they go out, it goes out.

Mr. FIELDS. If they go out, our flexibility will be much less than we have had in the past, and there are many projects, especially of the smaller nature, which could arise during the year and for which one might want to apply substitution in order to incorporate them into the actual program in fiscal 1956.

Representative DURHAM. That is why it is always better to have authorizing power.

Mr. FIELDS. Yes, sir.

Mr. DURHAM. That is the main point.

Mr. FIELDS. But I think my point is that, with the language we have suggested, if the substitution rider then should not apply, we would not have the flexibility which we have had in the past year and which we do consider essential.

Representative HOLIFIELD. Let's pass that and start in on the first item on your budget.

Mr. FIELDS. Very well, sir.

As we said before, the total amount of the request is $293,750,000. We have broken it down on this three-sheet handout we have given you by the areas of division responsibility.

In the Division of Raw Materials, we are requesting authorization in the amount of $6,465,000; the Division of Production, $27,644,000; the Division of Military Application, $68,698,000; the Division of Reactor Development, $125,212,000; Division of Research, $11,590,000 Division of Biology and Medicine, $6,040,000.

Then for general plant projects which would apply throughout the Commission structure, $17,960,000, and for capital equipment replacements and additions, $30,141,000.

If I may return to the Division of Raw Materials. The first item is for off-site access roads. Now the requirement for this stems primarily from the increased availability of ores in the United States and particularly in the areas of Utah, Wyoming, Colorado, Arizona, and New Mexico.

Most of the problem here is to provide access to the actual ore site and to get the ore to the mills for processing.

Representative DURHAM. Is that hard-surfaced roads?

Mr. FIELDS. In general this will not be hard-surfaced roads; it will be repairs to bridges, or it will be grading of roads, so that you can get into these sites and get the ore out.

Representative DURHAM. There are no State roads in this now?

Mr. FIELDS. There are State roads, but not in these particular areas. This would not be used just to improve State highways, but would be for access to the mines themselves.

Representative DURHAM. Could you improve State highways under this fund?

Mr. FIELDS. You could if it was required to do so. There are some State highways back into these regions that the State has not seen fit to improve. We would certainly—that would not be our objective. It would be so that we could have access to the mines themselves.

Representative HOLIFIELD. Some of those roads are very primitive in type.

Mr. FIELDS. Very primitive in type.

Representative HOLIFIELD. And if you were hauling out heavy trucks of ore over them it would do quite a bit of damage to them?

Mr. FIELDS. Yes, sir.

Representative HOLIFIELD. And you feel obligated to repair such damage as you would do to them?

Mr. FIELDS. We feel obligated, but we also feel the necessity to do this if we are to move the ore to our mills in the time that we are talking about.

Representative DURHAM. I am just asking the question because it is a little bit different from any of our military operations where we have specific control and they are used only by the military.

Mr. FIELDS. The next item is for the expansion and modification of the ore-processing plant at Monticello, Utah. I believe this is the only mill which the Commission operates itself.

It is an area where there will be increased ore which it will have to handle, and it will also process certain special ores which are not processed at other mills. It is to double the capacity for carbonate leach process at that particular mill and for handling the ores in that particular area.

On the storage——

Representative HOLIFIELD. Before we go further, General Fields.

Mr. FIELDS. Yes, sir.

Representative HOLIFIELD. Back to these State roads. In the case where there is improvement made on these State roads, is there an attempt to obtain joint participation on the part of the State involved? Do you explore that possibility?

Mr. FIELDS. Yes. Could I ask Mr. Johnson, of the Division of Raw Materials, to speak to that.

Mr. JESSE JOHNSON. In the past 2 years, and particularly for the fiscal year program 1955 as well as 1956, we wrote the Bureau of Public Roads particularly to attempt to get more participation on the part of the State and the counties. And during this last year the Public Roads sent one of its officials to discuss the problem of access roads with both the State officials and State highway officials and the county road officials.

Utah has consistently furnished about 10 percent of the cost of access roads. Colorado has handled the matter on an individual basis. Overall, we have obtained considerable participation on the part of the States and counties, particularly for maintenance in part, or construction.

But, as you mentioned earlier, the roads for the most part are in uninhabited areas or of sparsely settled areas, and the roads that were in, therefore, were adequate for the people before the uranium; and with the uranium haulage that is taking place, we not only require the roads for truck haulage, but if the roads are not improved, the original users of the roads would be without adequate service.

Representative HOLIFIELD. And these roads are made to proven ore sites in most instances?

Mr. JESSE JOHNSON. In most instances. They are to proven ore sites and areas in which there has been sufficient prospecting to know there will be ore coming out.

Representative HOLIFIELD. Is there any obligation on the part of the owners of these mines to participate in this road program?

Mr. JESSE JOHNSON. The owners of the mines, for the most part, carry the responsibility of the access from their mine to the truck lines and the feeder lines that go into an area. But in many instances, in most instances, the roads go down to an area where there are a number of individual properties and the road must not be a private road but a road that is available for all users.

Representative HOLIFIELD. In other words, you do not build a private road across privately owned property to a private mine unless it is in the general road system of the State?

Mr. JESSE JOHNSON. That is correct.

May I say one more thing?—that prior to 1950 when the Congress reestablished a mine access road program, the Commission did not participate in any road construction. But, beginning with the road program, the mine access road program, authorized by Congress in 1950, the Commission then worked with the Bureau of Public Roads in attempting to get the same type of road service, access road service, under the law that was given to zinc miners, lead miners, and others, and that was the way the program was continued up until fiscal 1955 when the Department of Commerce said that it felt that the uranium access roads should be included in the Commission's budget rather than the Department of Commerce budget. So it is only for the road program of fiscal 1955 and fiscal 1956 that the appropriations have come within the Commission budget.

Representative HOLIFIELD. Mr. Durham.

Representative DURHAM. Mr. Johnson, then can the committee understand that you have exhausted all means of trying to get States and the other local authorities to participate in building these roads, and then you are using your fund primarily after you have exhausted all efforts to get other means of access?

Mr. JESSE JOHNSON. I think I would say it a little differently, Congressman Durham, in that we have felt that the Bureau of Public Roads, which also participates in the building of State highways and has direct contact with the State highway commissions and with the counties, was in a better position to negotiate with the States and counties than we were, and we have asked the Bureau of Public Roads to endeavor to get maximum State and county participation.

The Bureau of Public Roads, incidentally, is responsible for the design and the construction of roads, and the Commission transfers the funds for the construction to the Bureau of Public Roads.

Representative DURHAM. Why I am asking that—most of these road programs usually expand rather than grow less, and I can see where we might get into a tremendous road-building program here which I do not feel, after all, we are responsible for to a certain degree.

Senator HICKENLOOPER. Mr. Chairman?

Representative HOLIFIELD. Senator Hickenlooper.

Senator HICKENLOOPER. How many miles of road are considered in this request?

Mr. JESSE JOHNSON. For the request of fiscal 1956, 275 miles.

Senator HICKENLOOPER. For new road construction?

Mr. JESSE JOHNSON. Both new road construction and improvement of existing roads. In some case access roads built in the past have proved inadquate for the increase in traffic.

(Discussion off the record.)

Senator HICKENLOOPER. Who gets the local gas tax on the gasoline used in the trucks—the State?

Mr. JESSE JOHNSON. The States.

I believe some States allow the counties some of the funds for maintenance of roads.

Representative HOLIFIELD. Let's take that second item.

Mr. FIELDS. Could I make a remark completely off the record so that our personnel here will understand what we are doing about the printed record?

Representative HOLIFIELD. Yes.

(Discussion off the record.)

Representative HOLIFIELD. Let's take the modification of the ore-processing plant now. That is a Government-owned plant, is it not?

Mr. FIELDS. Yes, sir.

Representative HOLIFIELD. And is this a final amount that you are asking for, or do you plan to keep on building this plant up?

Mr. FIELDS. I believe Mr. Johnson would answer that.

Mr. JESSE JOHNSON. This request of $1½ million, if used entirely, I think would complete the plant. I feel quite positive.

The reason for that request is the large ore supply within the area and the possibility of modification and the increase of the high lime circuit, particularly, which would give us more production during fiscal 1956. And we could do it faster by modifying that mill than by getting additional permanent mills in the area.

Representative HOLIFIELD. And this will increase the recovery of uranium by bringing in a better process, will it, or improving the process?

Mr. JESSE JOHNSON. There is an expansion program under construction now that will be completed in September of this year, that will give a high degree of recovery and economy of operation.

The original process that was used from the beginning, a carbonate leach process, has particular application to the recovery of uranium from high lime ores, and during the last 6 to 8 months there has been the development of a considerable tonnage of that type of ore. And we have some improved methods of handling these high lime ores. So it is proposed to expand the carbonate leach system, which can handle the high lime ores, both for increased tonnage and increased recoveries.

Representative HOLIFIELD. That type of operation would not appeal to private enterprise operation apparently. I am seeking to know why this is Government owned and operated rather than left up to private industry, just for the sake of the record.

Mr. JESSE JOHNSON. We have at Monticello today a mill which the Government owns and operates, and we have a carbonate leach system there. That section of the mill can be expanded more rapidly—it is in an area where there is an excess of lime ores. It can be expanded more rapidly than getting a private mill to do the job, start fresh and build an entirely new mill.

Representative HOLIFIELD. On the housing units there. What type of housing units are involved there?

Mr. JESSE JOHNSON. Those are 2- and 3-bedroom type houses. We have explored with the Federal Housing Agency in an attempt to get private industry to move in or to get Government aid under the Federal Housing Act by declaring it an emergency area. I believe, however, that the public law under which housing can be

provided by the Federal Housing Agency in an emergency area expires on June 30 this year, and it does not seem possible that we can go that route, although we are still exploring it.

The Federal Housing Agency is presently reviewing conditions in Monticello. We wrote them last December, and at that time they made a survey and indicated they thought it was possible to get, with Federal Housing assistance, private companies to build the housing. There is some housing going in, but it is not adequate.

On March 11, 1955, the Chamber of Commerce of Monticello again requested that the Federal Housing Agency reappraise the area.

It looks rather doubtful at the moment. As a matter of fact, it looks very doubtful if we can get assistance on this housing problem either through the Federal Housing Agency or by normal private loans.

Representative HOLIFIELD. Who will occupy these houses?

Mr. JESSE JOHNSON. The houses will be occupied by staff personnel and technical people employed in the Monticello mill.

Senator HICKENLOOPER. Mr. Chairman, I must leave and I would like to ask Mr. Johnson one question, if I may.

Representative HOLIFIELD. Go ahead.

Senator HICKENLOOPER. Mr. Johnson, returning to this access road proposition—$4,165,000. Do you consider that is essential in this? I mean that that is all needed and is essential for the purpose of moving this ore, and it cannot be accomplished in other ways than through this?

Mr. JESSE JOHNSON. Yes, sir; and that has been confirmed by the Bureau of Public Roads. The question is who pays for it, and we have done everything we can to get local authorities and States.

Senator HICKENLOOPER. This is a minimum amount that you need?

Mr. JESSE JOHNSON. That is correct, as of the present time.

Senator HICKENLOOPER. Thank you.

Representative HOLIFIELD. Mr. Durham.

Representative DURHAM. I want to turn to the storage of vanadium, Mr. Johnson. We have not been storing any vanadium before, have we? Have we not been letting that go into the stockpile?

Mr. JESSE JOHNSON. Yes, sir. With the processes in use on the Colorado Plateau from the beginning of 1948, uranium was recovered from uranium-vanadium ores and the surplus vanadium that was produced in the mills in the form of a commercial product transferred to the national stockpile.

All during the Korean war period, if it had not been for the uranium operations, there would have been a great shortage of vanadium. As a matter of fact, DMPA was looking around for projects to expand vanadium.

Now there is a surplus. Furthermore, there has been a change in the metallurgical processes so it is more economical, even if we were to recover vanadium, to take the uranium out first and then treat the tailings separately by a separate process to recover the vanadium.

Representative DURHAM. Have you exhausted all efforts to try to get them to build up the stockpile and set the objective a little bit higher and get us out of this storage business? Are we under obligation to buy this vanadium in the contract when we contract for the ore?

Mr. JESSE JOHNSON. Yes, sir; we have a commitment to buy the vanadium in the ore.

May I explain one further point, and it is in line with your question, Congressman Durham. With the new process we will not recover the vanadium in a commercial form, but the vanadium will be contained in the ground-up rock tailings. It will be stockpiled in tailings, owned by the Government, and will be a future reserve for military or commercial use.

Before undertaking this project we wrote the ODM, I believe it was, the authority in charge, and said that:

> In connection with future uranium mills, we do not propose to install a vanadium recovery unit. However, if the stockpile agency wishes to recover the vanadium in a commercial form, we would be glad to turn the tailings over to them as they come out of the mill.

The response we had was that the stockpile is adequate, has an adequate supply of vanadium, and that they would not be interested in the processing of the current vanadium tailings.

Representative DURHAM. That is just the point: We get ourselves in the ridiculous position of having the Stockpile Act, having funds available from it, of course, and here that stockpile becomes full, or rather up to the point where they feel that it is, and then we turn around and another Government agency begins to stockpile the same ore. That just does not make good sense to me.

I think we ought to try to get out from under this vanadium thing, if you are going to build up a stockpile here that will cost more than—$500,000 to start with. A small item, but I am thinking about the policy involved in this thing.

Representative HOLIFIELD. As a matter of fact, is this not an auxiliary result of trying to obtain the uranium? In order to make it possible for these people to produce the uranium ore, the Commission has, in effect, said: "We will not only take the uranium ore but we will also take this other content of the ore, these vanadium tailings." So this becomes a secondary result of our primary objective of getting the uranium, does it not?

Mr. JESSE JOHNSON. That is correct.

Representative HOLIFIELD. If we did not do that, you would have to raise the price on the uranium. Is that right?

Mr. JESSE JOHNSON. That is correct, or we would have to take a valuable product from the miners and pay them nothing for it.

But, in connection with Congressman Durham's question, we are getting out of the stockpiling end to this extent, Congressman Durham: We are not producing a commercial product of vanadium, and in the end we are going to produce uranium on the plateau from the uranium-vanadium bearing ores at a cost, with the new processes, that will probably not be in excess, or will be less than the original cost of the uranium alone, without consideration of the payments that are made for the vanadium. So that this is a program that will reduce our expenditures for the operations of the Colorado Plateau.

Representative HOLIFIELD. And this also is an outdoor storage of an unprocessed ore, which is different from the GSA stockpiling requirements, which require a processed product. Is that not true?

Mr. JESSE JOHNSON. That is true, and the processed product must be put in cans and have inside storage.

Representative HOLIFIELD. What is involved in the $500,000? Is that acquisition of ground or fencing or something like that? It is not coverage; is it?

Mr. JESSE JOHNSON. It is not coverage. It is acquisition of the ground and the excavation so that the material can settle without flowing down the streams, and the location of the site such as there will not be losses from erosion.

(Discussion off the record.)

Mr. FIELDS. I failed to ask one question here. I have proceeded on the basis we would go down through each item. In view of the fact that you have an analysis of the bill, perhaps you would like to proceed on some other basis. I do not know.

Representative HOLIFIELD. I think you are going all right. I think we have got this divided up pretty well here. I think we will go right down through it.

Mr. FIELDS. Is that sufficient on the Division of Raw Materials?

Representative HOLIFIELD. Yes.

Mr. FIELDS. The next division is for items for authorization for the Division of Production, totaling $27,644,000.

The first two items, the reactor modification at Hanford and the special reactor equipment at Hanford, totaling $11,900,000 and $5,600,000, respectively, are for improvements at Hanford in the production process.

(Discussion off the record.)

Representative HOLIFIELD. That is part 13 of the analysis.

Mr. FIELDS. The first one, we believe, would pay for itself in the matter of 3½ years, and the second one, the special reactor equipment, in 1½ years, with the returns to the Government corresponding to the amount we have requested.

The modifications to the separation and processing facilities at Hanford, in the amount of $2,560,000, are to overcome some health hazards involved in that separation process.

(Discussion off the record.)

Representative DURHAM. Why are your engineering fees so high? You state them at 14.9 percent against about 8 to 10 percent normal service costs.

Mr. FIELDS. May Mr. Bloch answer that.

Mr. BLOCH. The bulk of the work is engineering equipment rather than structures, and on engineering equipment, designing equipment, engineering costs do run somewhat higher.

Representative DURHAM. It is new designing of equipment, in other words?

Mr. BLOCH. Essentially process design and design of new vessels and new reactors, which is more costly than just engineering of a conventional structure.

Representative PATTERSON. Are these contracts put out to private engineering concerns or is it done within the Commission?

Mr. FIELDS. The engineering would be put out to private concerns, yes; architect engineering and construction also.

Representative PATTERSON. And supervision?

Mr. FIELDS. We would supervise it, although I imagine the architect engineer in this case would check specifications and performance and meeting of specifications, the actual construction.

Representative PATTERSON. They are all put out under bids. How do you do that, General? I would just like to know.

Mr. FIELDS. Well, sir, where it is possible to draw up specifications in advance and put them out on bids, this is our practice. There are certain things in the course of construction for which it is not possible to do that. This may be that.

Representative PATTERSON. Do you have 1 or 2 specific engineering firms?

Mr. FIELDS. We normally would have one engineering firm to draw up the plans and specifications and really develop what is put out in the invitations to bid to the contractors.

Representative PATTERSON. Is that a negotiated contract?

Mr. FIELDS. The engineering is normally negotiated, yes, sir. The contract with the engineering firm is normally negotiated, but for those things that can be built by lump-sum bidding, we issue specifications and invitations to bid, and anyone can bid on those. There may be several contractors involved in something of this nature, or the actual construction itself.

Representative PATTERSON. And the supervision?

Mr. FIELDS. The supervision is normally by the architect for us, with us supervising him.

Representative PATTERSON. And again his is a negotiated contract?

Mr. FIELDS. Yes, sir.

Mr. ALLARDICE. Are not architect-engineer contracts, according to the ethics of the profession, normally negotiated?

Mr. FIELDS. Yes; most of them are negotiated.

Representative COLE. I would like to inquire if Commission contracts are subject to the provisions of the renegotiation law.

Mr. MITCHELL. There is some question about this, Mr. Cole.

Representative COLE. Apparently then, they never have been or there would be no question about it. Has the Commission ever had any of its contracts renegotiated to determine profits?

Mr. FIELDS. I do not believe so.

Representative Cole. That is enough for me to believe the Commission does not believe they are subject to it.

Representative PRICE. I think the Ways and Means Committee is presently looking into that, and I think the Commission has testified before some committee here in Congress on that very subject.

Mr. MITCHELL. I might point out, if the renegotiation law does apply to our contracts, it need not be specifically mentioned but would operate as a matter of law.

Representative HOLIFIELD. You can also include that in your contracts, too, if you are interested in protecting the Government from exorbitant profits. You can include a clause in your contract along that line, can you not, Mr. Mitchell?

Mr. MITCHELL. Yes, sir, we could, whether or not it were required.

Representative HOLIFIELD. I know it is done in many instances. I know of some production contracts for defense materials where there is a clause in there which specifically says "This shall be renegotiated."

Representative COLE. What happens if you have not renegotiated unless the law specifically exempts your contracts? Do any of your people know? Has not that question ever piqued your curiosity?

Mr. FIELDS. I think perhaps many of our contracts are such were the question would not arise, under the type of contract they are—

for operation of facilities, where one has an operating contract, plus negotiated fee, or in many cases no profit whatsoever in the contract.

Representative HOLIFIELD. In the construction of Portsmouth, the staff informs me, you got $251 million back by negotiation. Rather, I mean on your own, as I understand it, without Government renegotiation.

Mr. FIELDS. Without renegotiation.

Representative PATTERSON. How did that happen? I do not understand that.

Representative HOLIFIELD. That was in the estimated cost of the plant.

Mr. FIELDS. It was in the estimated cost. The actual return of the contractor is negotiated.

Representative PATTERSON. I see now.

(Discussion off the record.)

Mr. ALLARDICE. I understand the presentation of this $2 million plant conversion is in order to meet a demand as of now. The underlying question, however, is whether or not you will proceed to also request a Government $20 million plant when you see a long-term demand as you did in the $69 million feed material expansion and not turn it over to a normal supplier relationship, and then justify it at that time on lack of ability and other considerations which do not allow you to go out and get industry to do it.

Could we have comment on that?

Mr. FIELDS. I take it it is the sense of this committee that when we come to that point we should look very thoroughly at it as to whether we do it in our facilities or whether one goes to industry for such a plant.

Mr. ALLARDICE. You will look at it before you make a decision to use or expand your own plant?

Mr. FIELDS. Yes, sir.

Mr. LIBBY. This is our general policy.

Mr. HAMILTON. Has any attempt been made to see whether this development program itself could be given out to an industrial organization under section 31 contract in order to remove it immediately at this early stage from a Government-owned facility and start getting the activity out into the hands of private industry?

(Discussion off the record.)

Representative HOLIFIELD. May I ask one question. I notice the architect-engineering costs are estimated around 22 percent on this plant.

Mr. FIELDS. Yes.

Representative HOLIFIELD. Why is there such a high estimate on that—14.9, and normally around 8 to 10? Is this because it is in the field of completely unknown engineering so far that they have to evolve?

Mr. FIELDS. It is an entirely different process. I presume that is the reason for this.

Mr. COOK. That is right.

Representative HOLIFIELD. Mr. Allardice.

Mr. ALLARDICE. On this Metallex plant, it is described as an experimental process. Why is this plant considered in plant and equipment when it is experimental, transitory, it is not a fixed capital asset, not going to last forever, it is going to be torn down; whereas,

the HRE and water boiler which met the same general description was under operating?

Mr. BURROWS. The difference between that and HRE is that HRE turns out nothing. It will be completely dismantled after we learn how to build it and learn the problems incident to building it.

Mr. ALLARDICE. Will not this be dismantled after building it?

Mr. BURROWS. No; not immediately. It will be a pilot plant for some time.

Mr. ALLARDICE. HRE turns out 5,000 kilowatts of electric energy, does it not?

Mr. BURROWS. Not for any productive use; no, sir.

Mr. FIELDS. If we were not to build a subsequent plant, then I would visualize this pilot plant operating rather indefinitely.

(Discussion off the record.)

Mr. ALLARDICE. Maybe I will understand as we go along.

Representative HOLIFIELD. Take the next item, please.

(Discussion off the record.)

Mr. FIELDS. The expansion of metal recovery facility at the Oak Ridge National Laboratory. This is to double the capacity of that facility and to increase some of the shielding of the particular facility in order that it may process and recover fuel loads that have a higher irradiation than is normally processed through our plant.

(Discussion off the record.)

Mr. FIELDS. The new community hospital proposed at Oak Ridge. We propose an authorization for a new community hospital at Oak Ridge, Tenn., in the amount of $2,900,000.

From our studies of the present hospital operation, we believe this is an amount that is justified in the replacement of that hospital, taking the major renovations that would have to be done to that hospital in the next 10 years, the operating costs of it, and the subsidies that might have to be applied if we did not construct a new hospital. So we believe it is appropriate to propose the construction of this hospital.

This would be a 175-bed hospital. This would provide beds in a ratio of 4½ per thousand population. It is something like a cost of $16,500 per bed.

On the water and sewer facilities——

Representative COLE. How soon do you expect to be relieved of the responsibilities at Oak Ridge?

Dr. LIBBY. Our disposal bill——

Representative COLE. The answer is just as soon as Congress will pass the bill that you have sent down here?

Dr. LIBBY. That would be the answer.

Representative COLE. And that presumably will occur before you could complete this hospital.

Dr. LIBBY. We do not know about that.

Mr. FIELDS. It presumably would; yes, sir.

Dr. LIBBY. Presumably.

Representative COLE. I do not understand how urgent is this hospital. Is it something the Commission has realized they needed for a number of years, or something all of a sudden you are going to give to the city of Oak Ridge as a farewell gift?

Dr. LIBBY. We need it in any case.

Representative COLE. The community does; yes.

Dr. LIBBY. Suppose the legislation is not passed. We would have to build such a hospital.

Mr. FIELDS. We have approached this item on the basis that, if we were to continue to operate, we would recommend that a new hospital be constructed.

Representative COLE. Understandably so. What would be your approach if you were relieved from the obligations of operating Oak Ridge?

Mr. FIELDS. I am under the impression we would still recommend that we go forward with this. But I perhaps should ask Mr. Cook to speak to this one. I am not familiar enough with it yet myself.

Mr. COOK. Under the panel's recommendations that studied release of operations of communities by the Commission, one of the things that they recommended was that in order for the community to become self-sufficient, that the AEC provide a new hospital that could be operated without subsidy. At the present time our subsidy averages about $100,000 a year just in operating costs alone, and it was determined that, if a new hospital could be built, it could be operated without a subsidy. That was one of the considerations that was filed in the legislation and in our discussions with the community—that we would propose that we construct a new hospital.

Representative COLE. That study was made by the panel in 1953?

Mr. COOK. The panel report was issued in 1951.

Representative COLE. Does the Commission now give assurance to the Congress that, if this new hospital is built, there will be no further obligation on the part of the Commission or the Federal Government to assist in the maintenance of the hospital?

Mr. COOK. Yes, sir; and the bill that is proposed contains no subsidy item for the hospital itself. And it was submitted on that basis with the understanding that we would submit and recommend approval of the construction of a new hospital.

Representative HOLIFIELD. May we return to the reactor modifications at Hanford?

Representative COLE. What is to become of the old hospital?

Mr. COOK. It would be disposed of, sir.

Representative COLE. Does this amount of $2,900,000 include the equipment necessary to have——

Mr. COOK. Yes, sir; completely operating hospital.

Representative COLE. Let me finish. A completely equipped hospital.

Mr. COOK. Yes, sir.

Representative COLE. Who is going to run it?

Mr. COOK. At the present time the AEC has a contract with a nonprofit group, consisting of a board of governors, who operate the hospital for the AEC.

Representative COLE. Do they operate all of the AEC hospitals or just this one?

Mr. COOK. Just this one at Oak Ridge, sir. It was assumed this group would continue to operate the hospital.

Representative DURHAM. If we build it, are we going to still hold title to the building or are we going to turn it over to this group?

Mr. COOK. It is planned that title would be transferred to the city.

Representative DURHAM. In other words, you are going to build them a hospital and give it to them, except we are not going to buy any of the expensive equipment, just going to build the building?

Mr. COOK. No, sir; we would build a complete operating hospital, turn it over to the city; and we would be removed from continuing responsibility in the operation of the hospital itself. The present subsidy payments we now make would be discontinued.

Representative PATTERSON. What is the purpose of all this? Why should we build a hospital and turn it over to the city when there is already a hospital in existence down there that needs improvement which possibly could be made by the city, just like any other town?

Mr. COOK. The tax revenues of the city itself are not adequate to undertake the responsibility of continuing the operation of the present hospital, and it was for this reason that the panel recommended——

Representative PATTERSON. If they cannot continue the present one, how are they going to continue the new one?

Mr. COOK. The new one would be designed and constructed as a modern integrated hospital; so it would be operated without a subsidy. The old hospital is a temporary-type structure built by stages during the war and is not amenable to low-cost operation.

Representative COLE. But it gets back to the basic fact that somebody is going to put it on a profit operating basis.

Mr. COOK. Not——

Representative PATTERSON. You are saying now the old hospital cannot operate unless it is subsidized, but the new hospital we build will operate without being subsidized; is that correct?

Mr. COOK. Yes, sir.

Representative PATTERSON. How does that work out? I do not see it from a business point of view. If a business is operating today and is subsidized, just because you change that business and put in a new building, you just cannot cut off the subsidy.

Mr. COOK. Yes, you can, sir.

Representative PATTERSON. How?

Mr. COOK. Because the old hospital was built during the war of temporary construction. It is a sprawling two-story hospital with several wings, and we feel that for the same bed capacity a modern hospital can be built so that the cost of operation, the cost of maintenance is less, so that the present subsidy now involved in the operation of the existing hospital can be eliminated by the construction of a modern hospital.

Representative PATTERSON. You are going to have to have some real sharp pencil boys in there to put it in operation under the recommendation that you are making, I think. I think you are going to find within a very short time you are going to have to come back here and look for some more subsidy.

Mr. COOK. In the present proposed bill there is no provision for subsidy for the operation of the hospital.

Representative PRICE. What is the present annual subsidy to the existing hospital?

Mr. COOK. The subsidy now is—it started out in fiscal 1948 at $805,000. It has been gradually reduced, until the last 4 years the average has been a little in excess of $100,000 a year.

Representative DURHAM. They do not have to invest any capital. After they start off free, if they cannot make money they are pretty bad business people.

But in case these facilitities were turned over to private enterprise, this community could come and make application through the Hill-

Burton Act and build a hospital like any other town. I am thinking about the fairness to the other communities. We have not gone out any place else I know of, the Federal Government, and built a hospital except where we own it ourselves like the Veterans' Administration.

Representative PATTERSON. The Veterans' Administration hospitals are the only ones I know of.

Representative HOLIFIELD. The present hospital is a frame barracks type building put up during the war, is it not?

Mr. COOK. Yes, sir; a combination of frame and cinder block.

Representative HOLIFIELD. The point at issue is the cost of maintenance and the inefficiency of its operation, because of the jerry-built structure that has been added to many times—that is what makes it inefficient?

Mr. COOK. Yes, sir.

Representative HOLIFIELD. And your argument is that if you build a modern, probably brick or concrete type, hospital it would be built differently and could be operated more efficiently. And it is further your contention in building this it will be an asset in selling the town project because it will complete the complement of your town; whereas, otherwise, it might jeopardize the sale or lower the sale of existing properties unless you do have this. Is this your point?

Mr. COOK. Yes, sir. And in addition to that, that by reason of the maintenance and money we would have to spend over the next 5 years if we continue to operate it ourselves, we would still make the same recommendation.

Representative PATTERSON. It does not sound like a good business deal to me.

Representative HOLIFIELD. I am not passing judgment on it.

Representative PATTERSON. When the Federal Government is stepping into a community and building a hospital we are going to give away.

Representative HOLIFIELD. It is now 12:30——

Representative DURHAM. Is it in the disposal agreement that you build this hospital?

Mr. COOK. It is not in the legislation that we would build a hospital. However, in calculating the payments which would be made to the city on a reducing scale over a period of 15 years, any subsidy in the operation of the hospital was eliminated on the assumption a new hospital would be built.

Representative PATTERSON. In the long run the Federal Government gets nothing for this expenditure of over $2 million.

Dr. LIBBY. No. We have a broader consideration there, Mr. Patterson.

Representative PATTERSON. It has to be broad—to the tune of $2 million.

Dr. LIBBY. We have a problem in disposing of this community in a fair and equitable way. The people there have about half the tax base that the normal community of that size has. We own all the plants. So they have a problem of getting along after they take the city over.

So, in preparing the bill, we took into consideration this new hospital as one of the plums that would be involved in the deal. And our payments for the schools are the only way in which the Federal Government will be liable for additional money, and this only for a

period of 15 years on a graduated scale. We did recommend that at the end of 5 to 10 years we look at these school payments, but the school payments are, in principle, the only way in which we are liable for further subsidy. The hospital is out of it.

This formula was arrived at by considering that we would try to give them a well balanced community with a good, modern hospital in it.

So there is that broader consideration that Mr. Holifield mentioned earlier in the whole situation.

Representative PATTERSON. Will there be other situations comparable to this one any other place you can think of?

Representative HOLIFIELD. Hanford, Richland, probably?

Representative PRICE. What is the population of Oak Ridge now?

Dr. LIBBY. 30,000 now.

Representative PATTERSON. Is there a town in your district of 30,000 and the United States Government steps in and hands them a hospital?

Representative PRICE. I do not know of any.

Mr. BLOCH. I think it is responsive to your question that we have this disposal bill which has been submitted now, and the basic concept underlying this bill is that we would turn over to the community government a set of community plants that were in good operable condition and would enable them to take over the operation of Richland and Oak Ridge, and, together with subsidy payment, to carry them for a period until they could build up their tax base and continue on their own as a self-sufficient community.

Representative PATTERSON. How are they going to build up their tax base for the future? Just give me a slight inkling of how they are going to do it. If they cannot do it now, how are they going to do it 5 years from now or 10 years from now?

Mr. BLOCH. These are currently Government-owned communities, sir.

Representative PATTERSON. I realize that.

Mr. BLOCH. We own them, and the only way the tax base can be built up is for them to get new industries into the towns or get higher priced property built in the towns, which will result in increased tax revenue.

We have followed a policy, as far as our operational facilities, of making do with what we have. A good part of the facilities we have were built in the wartime, temporary structures just like this hospital.

The basic reason that you cannot operate this hospital without loss is that—really two reasons—it was originally built as a 50-bed hospital, and it has been expanded and added onto since then; so that you have a layout that is just very uneconomical to operate. It is built of temporary wartime materials and they have deteriorated.

Representative PATTERSON. In your opinion, what new industry would be enticed to move into an area like Oak Ridge? Name just a few—manufacturers.

Mr. BLOCH. I think the industries that would be interested in moving to Oak Ridge are industries who would be associated probably with the atomic energy program, and perhaps would be packaging and marketing radio isotopes that are produced in the reactor facility down there.

Representative PATTERSON. Do they have a future to the point where they would be a real taxable project in an area like that?

Mr. BLOCH. I think so. It is hard to say at this point how far the atomic energy industry will develop, but I would think there are facilities at Oak Ridge which are peculiar to it, so that commercial industries who need those facilities or the products from them might well locate at Oak Ridge for economic purposes.

Representative HOLIFIELD. I think we had better adjourn now and try to come back at 2 o'clock.

(Whereupon, at 12:35 p. m., the subcommittee recessed until 2 p. m., this same day.)

AFTERNOON SESSION

(The subcommittee reconvened at 2:05 p. m., the same witnesses being present with the exception of Mr. Jesse Johnson.)

Present: Representatives Holifield (chairman), Durham, Price, and Cole.

Representative HOLIFIELD. The committee will be in order.

Before we proceed, Dr. Libby, you asked to make a statement in regard to the renegotiations subject we had up this morning.

Dr. LIBBY. Yes, sir. The General Counsel has a statement we would like to put in the record to complete it and augment it and correct certain things.

Representative HOLIFIELD. Mr. Mitchell.

Mr. MITCHELL. I would like to correct my testimony this morning with respect to the Renegotiation Act. I was not fully familiar with the point when it came up.

I find, on checking, that AEC contracts are subject to the Renegotiation Act, and we ordinarily include a renegotiation provision in our contracts.

There are, of course, certain exemptions in the Renegotiation Act itself which would be applicable to our contracts as well as to all others.

As to our actual experience, we are not able to say what has happened, because, as you probably know, sir, the Renegotiations Board looks at the total Government contracts of a particular concern, and we have been told that at the moment there are some 20 or 25 concerns who have largely subcontracts with the AEC who have been renegotiated and who are making refunds to the Government. But this is on an overall basis, and we have no knowledge as to whether, on our particular subcontracts, the determination was that the amounts allowed were excessive or not sufficient or what.

The total amount involved in these 20 to 25 concerns at the moment, we are told, is about $125,000.

Representative HOLIFIELD. You mean that is the total amount involved in their checking, in their sampling?

Mr. MITCHELL. No, sir. The total amount of refunds resulting from their total Government operations was $125,000 of the 20 or 25 who had subcontracts with us.

Representative HOLIFIELD. We want to return to the reactor modifications at Hanford and to the item of $11,900,000. Mr. Allardice has some questions to ask on that.

Mr. ALLARDICE. Have you considered, from a cost and experience standpoint, whether it might be more desirable to devote the money to new reactors rather than updating these?

Dr. LIBBY. The answer, I think, is that we have; though I would like to ask the General Manager to confirm that.

Mr. FIELDS. I am not sure we have considered it in exactly that context. But here are changes that could be incorporated into these reactors quickly and be used to increase production immediately. Any production that comes out of building new reactors would be of quite some subsequent years before it would materialize.

This is a part of the general process improvement work that has always been going on in the reactor field as well as gaseous diffusion and other production facilities.

Mr. ALLARDICE. Will this increase be the result of the 11.9 million or is that something else?

Mr. BLOCH. On these 2 reactors, the 11.9 million will result in a sizable increase, and that is all that we visualize for this particular increment.

(Discussion off the record.)

Mr. BLOCH. This, as far as we know, is by far the cheapest way to get this additional production.

(Discussion off the record.)

Mr. ALLARDICE. This will be done by GE force account labor?

Mr. BLOCH. No; the engineering will be done by GE, the major procurement will be done by GE. Anything that is actually construction work will either be done under fixed price contracts or, where they cannot be done under fixed price contracts, will be done by or under the J. A. Jones contract which we have at Hanford covering minor construction.

Mr. ALLARDICE. In other words, the GE operating budget for force account for general activities will not be used to apply to these?

Mr. BLOCH. No, sir. GE does not do any construction as such.

Representative HOLIFIELD. Let's proceed to the Division of Military Application which is next down the line.

Mr. FIELDS. In the Division of Military Application section of the request, we have a request for items totaling $68,698,000.

The first of these is "Weapons production and development facilities." Now this is an item which is a contingency item in the amount of $20 million.

In the past budget last year we had a contingency item of $5 million, and we have obligated at this point $4 million against that $5 million in last year's contingency item.

This particular item was $5 million until we requested a change in the authorization, coming about largely as a result of the tests in the Nevada tests this spring.

Representative HOLIFIELD. This actually is a contingency fund then?

Mr. FIELDS. This is a contingency fund.

Representative HOLIFIELD. Another floating fund, you might call it, for anticipated but unplanned projects?

Mr. FIELDS. They are anticipated, and we are not in a position to put them down specifically at this time.

Representative HOLIFIELD. But you think it will be in the fiscal year?

Mr. FIELDS. They will certainly come up during this fiscal year; yes, sir.

As I say, our experience last year, where we had $5 million, is that we now have $4 million obligated, and we have another item that we

probably will want to obligate before the end of fiscal 1955. And the only reason to raise this from $5 million to $20 million is that we now see the need for additional fabrication plant facilities which will require most of this $20 million.

Representative DURHAM. Do you get any funds at all from the military on this project?

Mr. FIELDS. Not for this sort of activity; no, sir.

Representative HOLIFIELD. This is really ordnance, is it not?

Mr. FIELDS. No; the military have never done anything on the development or fabrication of the nuclear material.

Representative DURHAM. I am thinking more about the building of a facility and things like that than about these fabrications. But you do not get any funds for any of it. You have to build the plants and everything under this?

Mr. FIELDS. That is correct. We do build training weapons for them and things of this nature that they fund for themselves and transfer the money to us. But those are on an item cost, procurement, in effect, from us.

Representative COLE. General, we have been told that the numerical increase of weapons next year will be considerably greater than they are this year. To what is that attributed?

Mr. FIELDS. It would be attributed next year primarily to the increased production of fissionable material. They are going up rapidly in amount—fissionable material that will be available from the gaseous diffusion plants and from the plutonium plants.

Representative COLE. Is that the product of new construction which is now completed and on the line of production?

Mr. FIELDS. Yes, sir.

Representative COLE. Or is that due to improvements in process?

Mr. FIELDS. It is largely due to Paducah and Portsmouth coming in, and Savannah River, but also to the improvements we have been making in reactors that we were discussing just before. It is partly both, but I think it is largely the plants that are coming in now.

Representative COLE. Is a measurable portion of it a result of improvements in weapon techniques as a result of the tests?

Mr. FIELDS. Some of it—I am a little trapped here on the time factor. I am not sure that from the tests in the immediate past that there will be something that will be realized that way in this coming year, but we will shortly thereafter.

(Discussion off the record.)

Representative COLE. The increase is rather staggering.

Mr. FIELDS. It is, yes, sir.

(Discussion off the record.)

Representative HOLIFIELD. Mr. Allardice?

Mr. ALLARDICE. I do not have any questions on this.

Representative HOLIFIELD. Go ahead.

Mr. FIELDS. The next item is the Art Construction project for fiscal year 1956 increment, in the amount of $17,873,000.

Representative COLE. Tell us again what "Art" means.

Mr. FIELDS. This is the project for the construction of storage sites for the storage of the weapons that are produced.

Representative COLE. All right.

Mr. FIELDS. This would be for the construction of sites at which weapons would be stored.

Representative COLE. Why does that need to be codified?

Mr. FIELDS. I am not sure just exactly, sir. We have had a previous project years ago that was called "Water Supply." This was another increment that was given this specific name.

Representative COLE. What harm is there in saying publicly that there is an item of $17 million for storage sites?

Mr. FIELDS. There is no harm in that. We have said it before.

Representative COLE. Why are we carrying on this refinement of the "art" by using the word "art"?

Mr. FIELDS. It is not necessary. It is for the construction of storage sites, and that can be in the printed record.

(Discussion off the record.)

Representative HOLIFIELD. Are you planning, then, on coming in year after year for additional requests? Can you say at this time whether you plan more of these in the future?

Mr. FIELDS. Something has to be done with the weapons, if it is decided to produce them. It depends on policy decision here as to how this goes. Someone will have to provide storage for them. I think we will get to reduced criteria on the storage of them. We should in the future.

Representative COLE. There are only three things you can do. One is to use them, another is to stop making them, and one is to store them.

Mr. FIELDS. That is correct.

(Discussion off the record.)

Mr. ALLARDICE. Under what type of contract do you construct these facilities?

Mr. FIELDS. The bulk of the work is done by invitations to bid construction under lump-sum contract.

(Discussion off the record.)

Representative COLE. May I ask a question here on the overall picture, which I would like to fix in my mind and would like to do it now before I forget it later. Is it correct that your request for new construction funds is the lowest for 1956 than for any other year in the Commission's history?

Mr. FIELDS. I believe it is the lowest since 1948. It is not as low as it was in the first few years.

Representative COLE. The lowest then in the past 7 years?

Mr. FIELDS. Yes, sir.

Representative COLE. And the trend as it appears now is that the following year will be still lower?

Mr. FIELDS. The trend as it appears now, yes, sir.

(Discussion off the record.)

Representative HOLIFIELD. The next item, please.

Mr. FIELDS. The next item is the New Sigma Laboratory at Los Alamos, N. Mex.

This is a laboratory for metallurgical work for the casting and fabrication of weapon parts. We have a facility there at the present time that is partly a temporary building, which is very crowded in space. This is one of the key divisions of the Los Alamos Laboratory and is the division that is charged with preparing all of the test vehicles that they have ever built and tested.

It also looks into completely new techniques that are required for some of these gadgets in order to produce them. It is a project which

we feel should go ahead in order that their capability may be maintained there to do this sort of work.

Representative HOLIFIELD. Mr. Allardice.

Mr. ALLARDICE. General, do you know what the construction costs at Los Alamos are compared to other areas of the country?

Mr. FIELDS. No, I do not know precisely; no.

Mr. ALLARDICE. Would it be fair to say they are probably just about as high as anywhere in the country?

Mr. FIELDS. I suppose that is true. They are fairly high. I am not sure they are any higher than, say, Washington, D. C., or New York City.

Mr. DERRY. They are higher than you would find in Savannah River or down in Tennessee.

Mr. ALLARDICE. Are they higher than, say, Sandia?

Mr. DERRY. It runs about the same, Sandia and the general locality.

Mr. FIELDS. I think they would be a little higher than at Sandia.

Mr. ALLARDICE. As we understand, to date about $100 million has been spent in expansion of Los Alamos in the last 4 or 5 years.

Mr. FIELDS. That is correct. It is essentially that. There was a new laboratory construction program approved in 1948. This was to put new facilities over on another mesa for the entire laboratory.

With these two projects—the new Sigma Laboratory and, in addition, the technical shops which come a little later—we will essentially have asked for all of the construction program of that new laboratory construction at Los Alamos, and it does total about $120 million; it will, when all costed.

Mr. ALLARDICE. Have you any policy concerning further expansion? That is, of the Los Alamos Laboratory.

Mr. FIELDS. We haven't any policy at the moment. We feel that the laboratory will have the technical facilities generally that it does need, and unless a new program comes in there, a different set of weapons program, we would not foresee the need for large new technical facilities.

I want to make a point, however, that we have firing sites and such things as this there, that from time to time have to be replaced, or something of this nature, that are more or less routine, but we would not be coming in for a new administration building or a new laboratory of large size.

Mr. ALLARDICE. If this project were built, would it entail later coming for money for site improvement, more roads, more utilities, and more housing?

Mr. FIELDS. No, sir; this would not require that. This is in keeping with the presently planned extension of the laboratory, although there is some expansion in this particular division that is a part of the present plan. I want to make plain that this is an integral part of the laboratory.

(Discussion off the record.)

Mr. ALLARDICE. We understand that your request is reduced $140,000 from what it was first proposed to be, and we further understand this was expended for architect engineering services out of your 1955 budget; is that correct?

Mr. FIELDS. Yes; that is correct.

Representative HOLIFIELD. Are there any other questions?

Take the next item.

Mr. FIELDS. The next item is a detonator production facility, not classified.

(Discussion off the record.)

Representative HOLIFIELD. The next item.

Mr. FIELDS. The next item is for "Base construction at the Pacific Providing Grounds." This is for items of warehousing, facilities for petroleum, oil, and lubricants, shops, structures at the Pacific Proving Grounds, on both the islands, Eniwetok and Parry.

There is a certain amount of work that we feel needs to go ahead to keep that proving ground in operable condition, and this request is for the items that would be capitalized there.

In that connection, these are the sort we pick out of the weapons budget anyway to make plant and equipment items. In our operating budget there are structures which normally might be construed to be plant and equipment, but they are such things as towers, bunkers, and this sort of thing, which are blown up every time we run an experiment. So we expense them.

Mr. ALLARDICE. These are ones you do not intend to blow up?

Mr. FIELDS. That is correct.

Mr. ALLARDICE. Have you sought to get Department of Defense participation in sharing the costs on these items?

Mr. FIELDS. We have an understanding with the Department of Defense with respect to what we build there at the Pacific Proving Grounds. In general, the understanding is that all capital items that we would build and budget for in the Atomic Energy Commission's budget, and look on that as a proving ground primarily of the Commission. If they come along and want to build a club or something of this sort, they do it themselves; but for the actual facilities that are required in the operation of these proving grounds, we budget for the technical facilities required.

Mr. ALLARDICE. Is this on a cost-plus-fixed-fee contract?

Mr. FIELDS. It is; yes.

Mr. ALLARDICE. And have you discussed the possibility of doing it on bid?

Mr. FIELDS. The question of doing it on bid has been considered from time to time in the past, but invariably it has worked out that it looked to be more costly because of mobilizing the plant and equipment of other contractors to come out there and do the work. These specific ones have not been considered in that framework.

Mr. ALLARDICE. Historically it was once looked at that way in Los Alamos, too.

Mr. FIELDS. I believe you are right.

Representative HOLIFIELD. The next item.

Mr. FIELDS. The next item is "Rocky Flats, Colo., plant facilities," again, in the amount of $1,330,000.

(Discussion off the record.)

We have a plant there that has been in operation now a few years, and these are some things that have developed which have become specific, so we put them in a line item, which seem to be necessary to smooth out the production line at that plant.

Mr. ALLARDICE. Are these devoted principally to the recovery of materials in process?

Mr. FIELDS. They are devoted principally to that.

Mr. ALLARDICE. And in that sense, you amortize them over a period of time?

Mr. FIELDS. They would be amortized over a period of time.

Mr. ALLARDICE. Do you know what period of time is used in calculating that?

Mr. FIELDS. I do not know.

Mr. GISE. I do not know. Not all of them are of that nature.

Representative HOLIFIELD. The next item.

Mr. FIELDS. The next item is "Base construction at Nevada test site, $927,000," which is for the construction of 16 dormitories. The one item.

Now our experience has been in Nevada that we have a very large population for a period of about 3 or 4 months which straddles the actual operational period. In this case, in the case of Teapot we actually have an operational period which itself is 3 months long. So it is almost 5 months that there would be a large population there. Peak population grows to something like 2,600 people for a period of perhaps 2 months. This has been our experience in the past. It is about half and half between military and Atomic Energy Commission employees and contractors. Presently we have space for, as I recollect, something like 800 in the dormitories there. The remainder of the population is forced to live in hutments that we have there, temporary hutments, that have been there for years. They are individually heated. They are very unsatisfactory in the winter and the maintenance on them is rather large.

We feel that if we continue at Nevada—and our thinking is that we should continue to run tests at Nevada—that we should provide the additional dormitory space.

With this additional dormitory space we would be able to handle a population of 1,500, and with 50 percent overloading of these facilities; we could take care of the load, but it would definitely take overloading of the facilities to do it.

Representative DURHAM. When you are not testing, what is the population then?

Mr. FIELDS. When not on test?

Representative DURHAM. Yes.

Mr. FIELDS. It would vary from something like, say, 200 to maybe 400, 500, depending upon whether construction was going on there.

Representative DURHAM. And you would have use for this about 2 months of the year?

Mr. FIELDS. I would say about 5 months during a test year.

Representative DURHAM. Five months?

Mr. FIELDS. During a test year.

Representative HOLIFIELD. It is not possible to use the barracks at Indian Springs?

Mr. FIELDS. There are not sufficient there to take care of this.

Mr. ALLARDICE. How much is your housing shortage at this base made more unbearable due to housing contractor personnel, that is, construction contractor personnel?

Mr. FIELDS. Quite a few of the construction personnel are housed there. I believe the number grew as high as 900 construction workers that were in here at one point. But a large number of them are gone by the operational period. It somewhat depends upon how things are ready, though, and whether we add shots to the series during the

course of the series as we did this time. But I do not think you can operate on the basis that you provide housing for your laboratory personnel and you do not provide any housing for your construction workers. You would find they would not come there.

Representative COLE. What is the need or advisability of concentrating your tests in a series over a period of 3 or 4 months rather than spreading them out over the year?

Mr. FIELDS. We have often thought, too, of spreading them out over the years, a period of years. We have never been able to do so. The laboratory seems to work in these cycles. It is the way it develops. I do not know how feasible it would be to put it on a continuing basis, if that is what you are talking about.

Representative COLE. Yes.

Mr. FIELDS. And go out there periodically. It may be that we should come to this after this series.

Representative HOLIFIELD. How about the weather element?

Mr. FIELDS. The problem is that even though you tried to scale it down, you do have a large supporting force that has to be there. Your weather element is one specifically. Your radiological monitoring crews have to be there. So I am afraid what we would end up with is a rather large number that would be there constantly rather than fall off in the in-between periods.

Representative HOLIFIELD. I really meant the status of the weather at different periods of the year rather than weather service crews.

Mr. FIELDS. We thought it was true that the period we have selected here this spring was the best period for running tests, and I think it is still true that this is probably one of the better periods in which to run tests. And there are some experiences on this. It depends a lot, though, on the size of the yield that your test requires.

(Discussion off the record.)

You would have to have weather service to clear for fallout. This spring, even, you have to be careful when you shoot or you could get, not dangerous fallout on cities, but something that you would not want to have fallout on them.

So you would have a fairly large supporting force that would be there a longer period of time rather than falling off in between tests. What we are doing, though, we are beginning to do operations there that had not been done there before.

(Discussion off the record.)

There may be some other activities which I think we will now encourage to go in there so as to absorb some of the overhead of the place.

Representative HOLIFIELD. The next item.

Mr. FIELDS. The next item is "Addition to technical laboratory shop building at Los Alamos," in the amount of $735,000. These are the few shops that were left back over on the old mesa at Los Alamos when a new shop was built on the new area—heat treatment and pattern foundry shops which we feel now should be moved over and become a part of the new shop there in the new area. With the move of the Sigma building and this building, then the transfer of the laboratory would be complete from the old mesa to the new area.

Representative DURHAM. Would that take all of the laboratories out of the old space at Los Alamos?

Mr. FIELDS. That would take all of the laboratories out of the old space. We would utilize those facilities, probably move AEC headquarters into one of these buildings that are vacated, use those buildings possibly for schools or garages for the community, for something like that.

Representative DURHAM. Would that be possible?

Mr. FIELDS. It will be possible for some of the facilities but certainly not for all of them. There are a number of them that should actually be demolished because they are fire hazards. I think we would clean up quite a bit. We have torn down the old D building which was the chemical-metallurgical building.

Representative HOLIFIELD. The next item.

Mr. FIELDS. The housing program at Los Alamos in the amount of $3,500,000 is the item we have requested. It will complete the program of replacement housing at Los Alamos. We hope it would complete the program of housing at Los Alamos, and at the moment we do not foresee an additional requirement for housing at Los Alamos unless some kind of a major increase in the program comes about for some reason.

We would hope this would build something like 226 houses—147 of them would be 2-bedroom, 57 would be 3-bedroom, and 22 of them would be 4-bedroom houses.

Representative DURHAM. Is that for new personnel there or taking care of present personnel?

Mr. FIELDS. As our plans started it was to provide to take care of strength of 3,100 in the laboratory itself, and it would do that. It would also take care of AEC, some of the concessionaires, schoolteachers that are there who have to be taken care of. We think it will fulfill our housing requirements for quite a few years to come.

Representative COLE. Is not Los Alamos one of the communities to be disposed of?

Mr. FIELDS. No, sir; there has been no planning to do so.

Representative DURHAM. Have you looked into it at the present time to see whether or not private individuals would go in and build the housing?

Mr. FIELDS. We looked at that before the last housing program, and it did not seem as though we would be able to induce anyone to follow this route. It is very definitely a one-industry town, and if anything happens to that, it is difficult to see how we would get risk capital to go in there.

Another factor is that the title to the land is not completely in the hands of the Atomic Energy Commission. We would have to clear up the question of title if we did this, too.

Representative DURHAM. Did we not have to rebuild some houses in the other project there before they got them put up?

Representative HOLIFIELD. I was on the housing committee that investigated some failure to provide the right kind of roofs and things like that in the early days. I remember that.

Mr. FIELDS. That was in the very early days. As a matter of fact, I believe that was done under the Manhattan project. I believe it was constructed under the Manhattan project, but the investigation was afterward.

Representative COLE. What is there about Los Alamos that makes it peculiar so that it should not be disposed of?

Mr. FIELDS. It seems to us to be even more of a one-industry town than Richland. It is completely the laboratory work that goes on there. It is dependent entirely on that. We have difficulty in our minds seeing how we would encourage industry to locate there with the long hauls to get to the place. It is more expensive to build there.

Representative COLE. That is true of Richland: It is a one-industry town and isolated.

Mr. FIELDS. There is probably another factor—that we feel that we should continue to have a proprietary right there as to the people who come in so that we are able to have housing for the scientists and technical men we need for the program.

(Discussion off the record.)

Representative COLE. The time was when an argument against disposal of Los Alamos was because of the location of the laboratories in the heart of the area. This does not apply now———

Mr. FIELDS. Well, it will be about a year and a half———

Representative COLE. And, therefore, the principal reason for not disposing of Los Alamos has been removed. And I am curious to know why you do not get rid of Los Alamos the same as you want to get rid of Richland. Is there any demand for it in Los Alamos?

Mr. FIELDS. There has been no demand for it in Los Alamos, no; not that I know of.

Mr. LIBBY. I have not heard of any.

Representative HOLIFIELD. Mr. Allardice.

Mr. ALLARDICE. This $3,500,000 for the opening up a new housing site includes streets, utilities, and site preparation does it not?

Mr. FIELDS. Yes, sir; it does, but it is a site on the present mesa, not a site on the other mesa.

Mr. ALLARDICE. By doing this, it does not open the possibility of a future request for more money for houses to fill in the sites we have developed under this authorization?

Mr. FIELDS. I do not believe so.

Mr. ALLARDICE. The AEC controls about 875 of the 3,500 houses at Los Alamos; is that right?

Mr. FIELDS. I believe that is the approximate number.

Mr. ALLARDICE. It turns out to be almost exactly 1 in 4. Is there any possibility of the number of houses controlled by the AEC being diminished, perhaps, by removing AEC people elsewhere, or perhaps some other mechanism?

Mr. FIELDS. We are looking at that constantly. It may be we will squeeze it down some. But the AEC does include, as you will recall, the guard force that we have directly on our own payroll. I believe your number would include the concessionaires.

Mr. ALLARDICE. My next question was to ask whether it does or does not.

Mr. FIELDS. And there is also the school and the medical center.

Mr. ALLARDICE. Are they all included in the AEC's 875?

Mr. FIELDS. They are all included in the 875 under the AEC. I can give you a breakdown, if you like.

For AEC itself, we have 582; concessionaires, 110; schools, 75; medical center, 40; telephone company, 16; post office, 20; and then there is miscellaneous, clergy, Geological Survey, FBI, United States Public Health Service, 32; for a total of 875.

Representative COLE. Who controls the balance?

Mr. FIELDS. The balance is an allocation to the laboratory and also to the Zia Co. The laboratory has something over 2,000. I do not have the number right at hand that are allocated to them.

Representative COLE. What is the total?

Mr. FIELDS. The total units this would provide us, providing we get bids that will permit us to build 226, would give us 3,464 housing units, of which 2,069 would be allocated to the laboratories, 875 to the AEC and others, and 520 to the Zia Co.

Representative DURHAM. Why move the headquarters down to Albuquerque if you people are going to stay up there and build more houses?

Mr. FIELDS. This is the field office headquarters, which has the fire department, guards, and these sorts of activities in the community itself.

Representative DURHAM. The University of California has got the contract to run the laboratories, have they not?

Mr. FIELDS. That is correct, but they do not run the community. We run the community.

Representative DURHAM. That is true. Do they bring permanent personnel there or operate primarily in the University of California?

Mr. FIELDS. They have a business manager for the laboratory itself right there. They do a lot of their own activities at the laboratory; yes.

Representative DURHAM. They stay there permanently?

Mr. FIELDS. Yes.

Representative HOLIFIELD. The scientists stay. Bradbury and quite a group live there on the hill.

Mr. FIELDS. Yes. They have something like over 2,900 employees at the present time on the hill.

Representative DURHAM. Then why move the office down to Albuquerque?

Mr. FIELDS. That office in Albuquerque has many offices under it, such as Rocky Flats. Its primary function is the coordination of weapons production development and testing programs. Los Alamos is one of the field offices and comes under the jurisdiction of the office in Albuquerque, only one of many.

Mr. ALLARDICE. How many of the 582 are guards or firemen?

Mr. FIELDS. I would have to check back and give you that answer specifically.

Representative HOLIFIELD. I am anxious to get to the reactor section; so let's go on if there are no further questions on this.

Mr. FIELDS. In the Division of Reactor Development we have items totaling $125,212,000, of which the first group is civilian power reactor program. The first item under that group is power reactor development acceleration project, in the amount of $25 million. Now this is the item of which we spoke briefly this morning. It is an item for the acceleration of the reactor program which might entail the construction of auxiliaries that are not now foreseen.

It might entail work in joint ventures with industry, or it might entail pushing of a type or types of reactors that for some reason industry itself did not consider it should go forward with but which we considered to be of great potential in the reactor field and merited that the effort on it be accelerated. It might be such a thing as a

homogeneous reactor, if the participation by industry did not come about and if we thought it should move ahead that rapidly.

It might be something like a 10-megawatt reactor, small power reactor; although in this case we would certainly attempt—and in the homogeneous reactor our intention would be to elicit proposals from industry, and to the extent that they would participate, we would probably proceed with participation with them. But we cannot at this time tell whether they would come in to do the entire project or whether it would entail support from the Commission.

Representative DURHAM. Do your applications, the ones before you from industry, justify such an item at the present time?

Mr. FIELDS. On the applications from industry at this time, we are in the process of evaluating them. They will take some support there from the Commission. The proposals are very complicated and have certain provisions in them such that it will be another month before we have them all completely evaluated. But in these I believe a participation that might come from the Commission gets to as high as—Ken, what is that figure?

Mr. DAVIS. On the construction side, it might be somewhere in the order of $15 million insofar as plants are concerned. We are still evaluating what the operating requirements might be, but it may be quite a substantial sum in addition.

Representative DURHAM. Do you try to put any figure on each project, that is, what a research reactor would cost you—$100,000 or $150,000, or whatever it happened to be, that you think is right to put into any number of reactors to which you might possibly lend assistance?

Mr. FIELDS. We have not put any number in here, sir, and I do not believe it would be a large number. But it might be 1 or perhaps 2. We do not have any one specific reactor in mind at this stage that would be put in as a part of this. I mean the planning is not firm enough to say it would be this one or that one.

Representative DURHAM. Do you visualize spending as much as $5 million on any one reactor project?

Mr. FIELDS. Yes, I think that one might spend that much on one project. We would hope we had the latitude to do so if it were indicated.

Representative COLE. Is it possible for any of this fund to be assigned to a licensee?

Mr. FIELDS. We do not contemplate that any of this money would be assigned to a licensee, if I understand the meaning of your term "licensee," in the meaning of the act.

Representative COLE. My question was to get an idea as to what extent the Commission was going to pay respect to that provision of the law that says that no Commission funds shall be used to subsidize a licensee. That is why I raised the question whether you are going to use any of this money for participation by the Commission with a licensee.

Mr. FIELDS. It would not be used for participation with a licensee.

Representative COLE. Then, to the extent that is used by the Commission, it will be by contract between the Commission and an individual, whether licensee or not?

Mr. FIELDS. That is correct. I am sorry. I have to check back with counsel on this.

Representative COLE. I did not see him nod his head very vigorously. I would like to hear him say "Yes" for the reporter.

Mr. FIELDS. Did you say "Yes"?

Mr. MITCHELL. I think the point would be this: We would, of course, have to make any arrangements we made under 31. We might end up with what is called a scrambled facility, where the Commission owns part and the licensee owns part.

Representative COLE. But it would be under authority of section 31?

Mr. MITCHELL. Yes.

Representative HOLIFIELD. And that might be to the licensee under section 104?

Mr. MITCHELL. Yes, sir.

Representative COLE. I think Mr. Hamilton wishes to clarify this.

Mr. HAMILTON. Yes; I would like to.

Does this mean that the Commission might use part of this $25 million to invest in bricks and mortar and physical equipment which would be installed in that plant or built for that plant for the benefit of the licensee rather than for the Commission?

Mr. MITCHELL. Not for the benefit of the licensee; no. The Commission would obtain title to whatever we spent for bricks and mortar, but you might have a mingling of the two in the same location.

Mr. HAMILTON. But the construction investment would be to what end?

Mr. MITCHELL. It would be to the end of going forward with the research activity which would be of a developmental nature.

Mr. HAMILTON. Then there would never be an allotment of construction money under section 31 contract to a licensee for the construction of a portion of his plant without which the plant would not operate were it not for that grant?

Mr. MITCHELL. As I understand it, you mean, sir, that we would grant money to the contractor to be expended by him for something to which he would retain title. I would say "No."

Mr. HAMILTON. Suppose a licensee is going to build a $50 million homogeneous reactor, we will say, and the plant to run would have to have a set of pumps on it to handle the primary fuel. Would the Commission contemplate using part of this $25 million authorization to contract with the licensee to build and operate those pumps even though his plant could not operate unless it had pumps on it?

Mr. MITCHELL. I would like to have Mr. Davis answer this.

Mr. DAVIS. No. As far as this $25 million is concerned, it was not our intention to use it in this way. Basically the main kinds of things we have had in mind were things that might be required to support the development work which is required on the part of the Commission and which the various applicants and licensees are depending upon. These would be basic additions to the Commission's research and development facilities. These licensees are depending on us to carry out development of fuel elements and chemical processing, and things of that sort.

Mr. HAMILTON. Could we come up with an example of a construction item the Commission might finance in a licensee's plant?

Mr. DAVIS. One thing that seems fairly evident from the studies so far of the proposals is, in order for us to process chemically the types of fuel elements that the licensees and applicants are thinking about,

we may have to make some additions or alterations to existing chemical processing plants.

Mr. HAMILTON. These would be additions to your plants?

Mr. DAVIS. Additions to our chemical processing plants, yes.

Mr. FIELDS. On the other hand, though, if we were to go out for proposals, say, later on this year, and we wanted a proposal for a small package powerplant of 10 megawatts, or we wanted one for a homogeneous reactor, and in these proposals we were to receive some where industry was willing to contribute a substantial amount, I would think it would behoove us to also consider whether by doing so we lessened the cost to the Government on a project we thought should go ahead.

Representative DURHAM. I want to congratulate you, you are just asking for $25 million instead of $50 million that the Bureau of the Budget recommended. Is that correct?

Mr. FIELDS. $50 million is in the operating fund, sir.

Representative DURHAM. Can any of these funds be spent under international agreements for development of reactors for power.

Mr. FIELDS. The reactor I was speaking of particularly might be useful in the foreign field. I do not think in building it we would participate——

Representative DURHAM. I mean, if somebody came in and made application under an international agreement, could you not use this fund just as well as you could in this country, if you felt it was wise and made the decision.

Representative HOLIFIELD. For instance, build a demonstration power reactor in Japan, let us say, just as an example.

Mr. FIELDS. I would think if you give us the authority we might consider doing it.

Representative DURHAM. You have it under international agreements under the act.

Representative HOLIFIELD. I think that is in the executive branch to make the agreement, but our question was, could this fund be used for that purpose. It says "power reactor development acceleration project." It is not particularly limited apparently, but my concept of that is this is a floating fund, and you use such part as might be necessary to accelerate research and development in any of these five power reactors which we are now working on.

Mr. FIELDS. Yes.

Representative HOLIFIELD. Is that right?

Mr. LIBBY. Yes.

Representative HOLIFIELD. Under 31 you can give research assistance, in my opinion, in the furthering of the art; you can give research assistance to, let us say, the Consolidated Edison's project.

Mr. FIELDS. Yes.

Representative HOLIFIELD. For instance, if they want some particular work done in your laboratories, could you do that without charging them and use this fund? Or would you have to charge them direct?

Mr. FIELDS. I think we could use that in connection with the $40 million, but perhaps Mr. Davis could speak to this point a little bit more.

Mr. DAVIS. Insofar as the construction goes, there is one example which I think is along these lines. That is, the Detroit Edison group in proposing a fast breeder, have asked the Commission make what

we call dynamic retrenchment studies of a fast reactor core. This is the type of development program we would intend to carry out sooner or later anyway, and the need for it is becoming increasingly obvious. We had thought perhaps on the order of $2 million of the $25 million might be required to construct the facilities for carrying out the very difficult dynamic test of fast reactor cores. This would be a development which would be for the benefit of the overall program, rather specifically to both our fast breeder project and Detroit Edison's project.

Mr. ALLARDICE. Would this be the core itself or the facility to do the core testing in?

Mr. DAVIS. The latter, the facility to do the core testing in.

Mr. ALLARDICE. How would you fund the core?

Mr. DAVIS. We would expense the core as operating.

Representative HOLIFIELD. My understanding is this would be allowable. I think it would further the art and would give technical information to the Government as well as to Consolidated Edison, and I think that would be proper use of this fund. I speak as one member only.

Mr. HAMILTON. I think the example used is a good one because it is the kind of thing I think was visualized when the law was written. There are some others which would be more questionable.

That is the specific thing we were trying to provide for last year in section 169. In the event that a licensee builds a facility and that facility lends itself peculiarly well to the conduct of an experiment the Commission wants to conduct, the exception was provided to permit the Commission to go into this licensee's facility under a section 31 contract and build the necessary addition to his plant to permit you to conduct your experiments for your program in a licensee's plant.

If that is used—the matter came up in February—whether you can turn that around and use that same exception to give construction money to a licensee to assist in the building of his plant which is peculiarly to his advantage. As long as the advantage accrues to the program and any other licensee who comes in with a parallel or comparable project, and that information and the benefits of the experimental facilities that are built, or whatever may be involved, is available to you in toto, it is clearly for the program rather than solely for the licensee, I think you carry out the provisions of the law very clearly.

Representative HOLIFIELD. That is my understanding.

Mr. HAMILTON. Only if you came in, with the pump example, where he has to have a pump to run his plant, and you not only pay for the development, you also buy it for him, even if you retain title, it is obvious it is just for him, then you get into the gray area.

Apparently there are a lot of things, Mr. Holifield, which are clearly authorized by the law, and the $50 million and the $25 million could easily be used up on these. I mean, the Commission is allowed to give material free, allowed to do research for the licensee free; it is allowed to loan the fuel free, and to allow the burnup to take place free. All of these items are expense items and could easily over a group of 4 or 5 or 6 major licensees use up this amount of money.

Mr. ALLARDICE. But is it not true that all of these are what accountants of the Commission call operating items and do not come under this $25 million at all?

Mr. HAMILTON. If you go to Argonne and build a new critical facility in order to conduct fast breeder experiments which are going to be for the benefit of Detroit Edison as well as to the total program, there would be construction money involved.

Mr. ALLARDICE. A frame building——

Mr. HAMILTON. If the Commission constructs the facility as part of Argonne, but it is built in order to expedite getting certain information.

Mr. ALLARDICE. The items you mentioned, charges for fissionable material and several others all come out of operating money of the activity and this is not concerned with those.

Mr. HAMILTON. All operating, except the Commission is authorized by law to do research and development under 104 (b) for licensees without charge. This may require an addition to Commission facilities to permit the conduct of that research and development.

Mr. ALLARDICE. That is the only area where the $25 million would come in.

Mr. HAMILTON. That appears to be where the $25 million primarily is going to go.

Mr. DAVIS. Not entirely.

Mr. FIELDS. I would like to ask Mr. Davis to give the sort of things we are thinking of that might fall under the $25 million.

Mr. DAVIS. We talked a lot about the power reactor demonstration program. We regard this as power reactor development acceleration projects and not limited completely to the demonstration. We mentioned that fact that alterations of a minor nature might be required to the chemical processing plant simply to handle fuel elements, and so forth, under the demonstration program. I mentioned the dynamic core tests and we have mentioned the construction of a 10,000-kilowatt small reactor, which we might build with a Government-financed project if such a development had to be carried out in that manner.

Additional kinds of things which would be required which are not directly related to the demonstration program would be such things as perhaps expanding our facilities or building new facilities for Commission laboratories to study the fabrication of plutonium-bearing fuel elements.

Mr. ALLARDICE. At that point. Supposing one of the people who came in under this April 1 deadline decided they would like to do a study on plutonium fabrication or plutonium reprocessing, would you consider funding it out of this money as part of the development program?

Mr. DAVIS. This would be again construction of facilities rather than funding of the development work, but I would say if we built facilities to carry this out at one of the Commission laboratories——

Mr. ALLARDICE. You would have to own the facilities yourselves?

Mr. DAVIS. Yes.

Mr. ALLARDICE. You could not build them for someone else?

Mr. DAVIS. This is what we are contemplating here in this type of thing: We have underway, or are trying to get underway at Argonne, the construction of a facility to handle the refabrication of plutonium fuel elements. This appears to be an area that requires a little more work as we look into the real difficulties of the chemical processing end of the business.

Another thing that seems to be in very short supply, for example, are hot caves for making materials tests. You probably know testing materials is a very highly statistical business, and we have found so far that our work has required enormously larger numbers of specimens and much greater range of variables than we had contemplated. So there is a very serious limitation on hot caves and facilities for testing fuel element materials and structural materials required to construct—and this fall, failing large industrial contractors starting to spend money to do a portion of this work——

Representative DURHAM. Why could you not tie it down to purely experimental reactors and not get in this field here, because you are going to do what you want to with your own in your own laboratories?

Mr. DAVIS. Some of these early items will be required for licensees' reactor demonstration reactors.

Representative DURHAM. They would be for experimental reactors, not to build 100,000-kilowatt reactors to produce power with.

Mr. DAVIS. I think if you include 104 (b) licensees' reactors as experimental reactors, that would be true.

Representative HOLIFIELD. Mr. Allardice.

Mr. ALLARDICE. Would any of this $25 million be used to build facilities at other than Government-owned sites?

Mr. DAVIS. None of the items that I have here would cover things of that sort; no.

Mr. ALLARDICE. Would such a limitation interfere with your desires?

Mr. DAVIS. It is hard to tell at the moment. As I say, at the moment we do not have any concrete visualization where this would be required.

Mr. HAMILTON. I think it might be difficult to use that kind of language, because you might find that you wanted to conduct an experiment in a licensee's facility, which was the thing we started out trying to do.

Mr. ALLARDICE. That would happen after you knew where the facilities were and you would have time to come back for authorization.

Mr. HAMILTON. You do not know because you do not know where the development is going to be. If you had something that said—would this be of interest?—if you had language to the effect that none of this $25 million construction authorization shall be used for the construction of any portion of the basic design of a licensee's facility, would that kind of language be interference?

Mr. FIELDS. It seems to me it could be if you found an industry which was willing to contribute to a specific reactor but not willing to contribute the entire costs, and you thought it should go ahead.

Mr. HAMILTON. This word "contribute" is the one that is bothering us.

Mr. ALLARDICE. That is the one on which you have problems under 169.

Mr. HAMILTON. They either build or do not, and there are a specific number of things the Commission can do which are in support of any licensee who is allowed to go forward at all. Therefore, whether they contributed what you regard as 50, 60, 80, 90 percent of the total costs, in all cases you have the option under construction and operating funds under the law of covering approximately 20 or

25 percent of the total cost of all 104 (b) licenses. So this is an across-the-board subsidy authorized by law, whether you call it encouragement, subsidy, or incentive.

Representative HOLIFIELD. Your thought is, Walter, that you think this would come under section 169 and clearly be prohibited because it would be a subsidy?

Mr. HAMILTON. If in a licensed facility, to permit that licensed facility to do something for the Commission's development program other than that which the facility would otherwise have accomplished, that clearly is within the meaning of 169. But if the construction money is put in to accomplish something which is part of the basic job the licensee sets out to do and he could not make the plant run without your contribution, then it seems to me it is beyond the meaning of 169

If you offer to build the reactor vessel for him, for instance, as a construction item out of the $25 million—if he did not build a reactor vessel, he would not have a reactor—therefore, I think in strict terms you cannot put that money in. But if he was going to build a certain reactor vessel for $100,000, and if he spent $25,000 so the reactor vessle could have certain types of ports in it which would permit the conduct of experiments for your program, and you put $25,000 in on top of it to get him to modify the design and adapt it to your needs, then I think it falls on the other side of the line.

Dr. LIBBY. I could give another example of the kind of expenditure we might contemplate. I was personally very disappointed to see that none of the proposals we received on April 1 included what I call the chemical type of reactor, that is, homogeneous type of reactor, which I believe is likely to give us the cheapest power, at least in large quantities at stationary powerplants.

I suppose that, if on the next go-around we still get nothing, I would be very strongly in favor of the Government's going ahead on its own on this type of development, and I think the $25 million would apply in this case.

Representative DURHAM. The next go-around of what, Doctor?

Dr. LIBBY. Of invitations.

Representative HOLIFIELD. I hope you keep that feeling. As far as I am personally concerned, I would like to see that homogeneous reactor built, and I think if no one else will do it that the Government should go ahead and build a pretty good-sized one, a prototype size at least, at Government expense, providing a sufficient number of scientists agree it is a promising field.

Dr. LIBBY. We were quite surprised that no one came in with that. I was very much so.

Representative HOLIFIELD. The next item.

Mr. HAMILTON. Before we leave this, Mr. Holifield, could the Commission be asked to try and suggest any kind of language which might be attached to that particular item which would be a better definition of what it would be used for?

Representative HOLIFIELD. Will you give some consideration to that, please?

Dr. LIBBY. We will, sir.

Representative HOLIFIELD. To clarify in our minds exactly what you intend to do with that $25 million.

Dr. LIBBY. I think in the light of the discussion that we understand what you want. Do you not agree with that, Mr. Fields?

Mr. FIELDS. Yes.

Representative HOLIFIELD. You will have an opportunity to look at the record and study it.

Representative COLE. I would like to inquire of the Commission, what does it interpret section 169 to prohibit the Commission from doing with respect to Commission funds?

Mr. MITCHELL. I think, Mr. Cole, that section 169 is a general prohibition against use of Commission funds to subsidize a licensee under either section 103 or 104 except the Commission is given authority to make arrangements under section 31 that is, for research purposes, to make such arrangements with a licensee.

Now I think those arrangements might contemplate either the furnishing of services by the licensees or the construction of facilities by the Commission so long as the Commission retains title and so long as the construction was directed toward a purpose which was included in section 31.

Representative COLE. I have been impressed with the Commission's interpretation of that section. My conclusion is that the Commission feels that the net effect of 169 is, as a limitation on the Commission's operation, rather nebulous and meaningless. Or, to express it differently, the prohibition of section 169 can be very easily and readily circumvented.

Mr. MITCHELL. I would not think we have that thought, sir. Perhaps the Duquesne reactor will give us an example of the kind of arrangement that might be made.

If the Atomic Energy Act of 1954 had been in effect when the Shippingport arrangement was approved and the contractor had done the whole job, I think that a 104 license would have been necessary. You note there the Commission funded and owns the reactor itself, and an electric utility company runs the generating facility. I think the reactor and the generating facilities are probably a utilization facility within the meaning of the law. So there we would have a situation of what I referred to earlier as a scrambled facility, where, if the Commission thought that the state of the art was being sufficiently advanced by its expenditure, it would be justified in doing so under section 31.

Representative COLE. Which is exactly the way you did it without the law.

Mr. MITCHELL. Before the present law was passed.

Representative COLE. Even with the law as it is now written and in force before the Shippingport deal went through, you still would have proceeded under section 31—I mean the principle.

Mr. MITCHELL. That would have been the theory of it; yes, sir.

Representative HOLIFIELD. It actually comes down to a matter of judgment as to whether any such research assistance as is given in the art at this stage is of general benefit, more of general benefit than it is to the individual, that is, company, that is building the reactor. You have got two things to be accomplished. The private corporation that is building the reactor is building it ostensibly for their own use, but at the same time, by the very nature of the art at this time, if it is in essenee an experiment, and it is, I think under 31 you are allowed to give research and development assistance even though it

does benefit these people, as long as it benefits the art more, let us say, or brings into existence information which will be of general benefit.

Now, I think you would have to use a lot of judgment as to how far you went. I do not think you could go in and build a reactor for Consolidated Edison. But if there were some phase of that reactor where they needed research assistance and it was in line with the Commission's judgment that it did further the art, then there would be no granting to Consolidated Edison sole use of such research benefits, and it would seem to me you could use some of this $25 million for that purpose.

I speak as an individual member when I say that.

Mr. ALLARDICE. Mr. Mitchell, so you mean by your interpretation that if any such research assistance involves capital items that the title to those items must be in the Government?

Mr. MITCHELL. So far as the use of Commission funds for construction facilities——

Representative HOLIFIELD. Bricks and mortar?

Mr. MITCHELL. Yes. I would say "Yes."

Mr. ALLARDICE. To that extent it would not be owned by the licensee, nor would it come under the license, so to speak, would it?

Mr. MITCHELL. That is right, but——

Mr. ALLARDICE. It would be Government activity.

Mr. MITCHELL. But in connection with Government activity.

Mr. HAMILTON. The meaning of 169 then is that we cannot give title away.

Representative HOLIFIELD. The next item.

Mr. FIELDS. The next item is a "Fast power breeder pilot plant, EBR," in the amount of $14,850,000.

This would be for construction of this pilot plant in conjunction with the reactor program. This is one of the five reactors that are in the Commission's own program.

Representative COLE. Is this the third one?

Mr. FIELDS. You mean the third breeder?

Representative COLE. The third one of the five.

Mr. FIELDS. I am not sure whether it is the third one of the five. The 5 are the PWR, homogeneous reactor, boiling water reactor, the fast breeder reactor, and the sodium graphite reactor—are the 5 in the Commission's program.

Representative COLE. Three are already under way, are they not?

Mr. FIELDS. Yes, sir.

Representative COLE. Then this is the fourth.

Mr. FIELDS. This is the fourth one.

Mr. COLE. Yes, and this is being done by the Commission on its own?

Mr. FIELDS. On its own, yes, sir.

Representative DURHAM. Where at?

Mr. FIELDS. It would be built at the National Test Site at Arco.

Representative HOLIFIELD. Mr. Hamilton.

Mr. HAMILTON. Is the construction of this a condition precedent to the Detroit proposal for construction of a full-scale breeder?

Mr. FIELDS. I would not put it as an absolute condition; but certainly Detroit Edison's proposal is on the basis that our work on the breeder reactors would go forward, yes.

Mr. HAMILTON. This is in no way a duplicate of their proposal? This is not something they would do if you did not do it?

Mr. FIELDS. No, they would not do this sort of operation, as I understand it. Perhaps Mr. Davis should speak further to that point.

Mr. DAVIS. My understanding from Detroit Edison is that they are counting on our going ahead with both our development work and construction of EBR No. 2, that this is technically required for them to proceed with their project.

Representative HOLIFIELD. Here is a very clear case, it seems to me, of where Government money is being used which will be of benefit to Detroit Edison and be of benefit to the whole art.

Mr. HAMILTON. Then it is not unfair to say that the other $25 million kitty for the acceleration program is a less specifically identified one; therefore, it is much similar to this specific one?

Mr. DAVIS. If you look at expansion and acceleration as the same type of thing.

Representative HOLIFIELD. Mr. Allardice.

Mr. ALLARDICE. Why do you believe this intermediate step has to be gone through before you can go to a full-scale reactor?

Mr. DAVIS. This is about 40 times as large as the EBR No. 1 in terms of power output, and it is of the order of about one-sixteenth the size of the so-called reference design, which was a 1,000-megawatt reactor. And the problems in the fast breeder increase rather sharply as you increase the power, for the reason that in a fast reactor you have an exceedingly small core, and your central design and research problem is how to get a given amount of heat out of what would be very small space, and this is an exceedingly difficult job.

Mr. ALLARDICE. You would not feel putting another $20 million with it and going to full scale would be a good investment at this time?

Mr. DAVIS. I do not believe so, no.

Mr. ALLARDICE. Secondly, is there any possibility of industrial participation in this project, that is, contributions from industry as to heat exchanger studies and such in connection with your work?

Section 169 does not prevent the flow the other direction, you know.

Mr. DAVIS. You mean they should give us heat exchangers and things of that sort?

Mr. ALLARDICE. Yes. Since the information is going to benefit industry, are any of them interested in participating in it?

Mr. DAVIS. Of course, many of them are participating as subcontractors to the Argonne National Laboratory in developing pieces of equipment. We are still paying for this, and I would say we should continue to do so, because it is the only way we can have real control over the specifications and schedules and things of that sort which are necessary to complete the project.

Representative HOLIFIELD. Are there any questions?

Mr. Price.

Representative PRICE. No questions.

Representative HOLIFIELD. Mr. Durham.

Representative DURHAM. Mr. Davis, this recommendation on this reactor, to go this way and build this type and size of reactor, how did you arrive at that conclusion? Was that the reactor study group or was it made by recommendation of other individuals in the reactor field?

Mr. DAVIS. Insofar as picking this particular power output?

Representative DURHAM. Yes.

Mr. DAVIS. The objective there was to go to no higher power than would be required to essentially duplicate the conditions in a full-sized reactor. You cannot do this entirely, but you can, by adjusting the degree of enrichment and various other factors, come up with a reasonable approximation anyhow of conditions inside a full-scale reactor, and the engineers and scientists at Argonne chose the size here as being the reasonable compromise here between cost and the information obtained.

Representative DURHAM. Then we can say that the reactor division of Argonne made this recommendation to go this way on this size reactor instead of going to a larger one?

Mr. DAVIS. That is correct.

Mr. FIELDS. For purposes of continuity, Mr. Chairman, perhaps Mr. Davis should just proceed down through the reactor items here. I have not had a chance in the 8 hours or so I have been on the job.

Representative HOLIFIELD. That is perfectly all right. We will be glad to hear from Mr. Davis.

Representative COLE. This is an appropriate time for me to ask Mr. Fields a question I was going to hold back until the end of the hearing and that question was to ask him how long he had served as General Manager of the Atomic Energy Commission.

Mr. FIELDS. I was sworn in at 9:15 this morning.

Representative COLE. Let me compliment you on the excellence with which you have done your homework. To me it really—I do not know to what to attribute it—it is difficult for me to visualize that a person having responsibility for the Division of Military Application should be as well informed with all the ramifications of the atomic energy program as you appear to be. It may be that your job as Director of Military Application does take you into all of the fields of the atomic energy program. If so that explains your facility as a witness today.

Mr. FIELDS. Thank you, but I am afraid I got lost on the sections of the act there.

(Discussion off the record.)

Representative COLE. You have done a fine job.

Mr. FIELDS. Thank you.

Representative DURHAM. I concur in that. I think you have too.

Representative HOLIFIELD. All right, Mr. Davis.

Mr. DAVIS. The next item is the "Reactor core test facility at Arco." This is a permanent installation to make the transient or dynamic tests of reactor cores, which involve a single permanent type of blockhouse or control house with some facility in it for recording, making chemical tests and things of that sort. At the present time I believe we plan two outlying buildings which will be the actual test centers themselves

At this facility we plan to take first of all pressurized water type of cores and to study what happens to them when we make sudden changes in the reactivity.

This was done earlier, as you may recall, at Borax 1, and we were finally able to destroy this reactor. We do not plan to destroy reactors under this program, but this is always a possibility when we are making dynamic tests near the end of the range.

Representative HOLIFIELD. Are there any other facilities like this anywhere, Mr. Davis?

Mr. DAVIS. No, sir; we do not have any others.

Representative HOLIFIELD. This would take care of an experiment like Dr. Zinn conducted?

Mr. DAVIS. This is an outgrowth of Dr. Zinn's experiments, and we learned so much from that we felt this was an area we had to continue to explore, and it appears to be very profitable.

Representative HOLIFIELD. Mr. Hamilton.

Mr. HAMILTON. Are there any concerted efforts being made by the Commission to handle the destructive tests of reactor systems which are to be conducted in this program in such a way as not to adversely affect public reaction and the reactor safety people's reaction to these designs?

There is some tendency, if you can succeed in destroying a system, to have it be the conclusion that this system is not, therefore, inherently safe.

Mr. DAVIS. I think, first of all, by conducting it as an acknowledged experiment that you allay some of these fears.

Secondly, as I mentioned earlier, we do not actually anticipate we will destroy the facility.

What we are trying to do is so design a test that we can find out how these cores behave and what the characteristics are that lead to a bending of the fuel elements and things of that sort, without actually pushing them to the point where we would blow the whole core up.

Representative DURHAM. You are trying to allay the fears of the insurance people somewhat, are you not?

Mr. DAVIS. That is correct. This is not a program for blowing up reactors, reactor cores.

Representative HOLIFIELD. I think we are all in favor of that. Let us go on now to the large ship reactor.

Mr. DAVIS. The next item is the "Large ship reactor." This is a prototype for a large ship and will consist of two reactors powering a single shaft in a naval type of propulsion plant.

(Discussion off the record.)

Mr. DAVIS. The prototype will be built at Idaho, according to present plans, at the National Reactor Testing Station.

Representative COLE. Is this the project which was abandoned last year?

Mr. DAVIS. This is similar to it.

Representative COLE. Then this is a revival of what was discarded last year or——

Mr. DAVIS. Two years ago.

Representative COLE. Two years ago.

Mr. DAVIS. A few embodiments are somewhat different in details of design and execution.

Representative COLE. Perhaps you are not in a position to answer it. I am curious to know whether the Joint Chiefs of Staff have prescribed a military requirement for a large ship reactor.

Mr. DAVIS. Yes; we have a requirement for this project from the Department of Defense.

Representative COLE. I am talking about the Joint Chiefs of Staff right at the moment.

Mr. DAVIS. I know this has gone to the National Security Council.

Representative COLE. The National Security Council eliminated the large ship reactor 2 years ago, to my recollection.

Mr. DAVIS. That is correct.

Representative COLE. I am curious to know what has transpired in the interim to have caused a reversal in opinion by the National Security Council with respect to the large ship reactor.

Mr. DAVIS. Of course, I do not know exactly. I would judge it has probably been the success with the submarine reactor.

Representative DURHAM. Your request came from the Department of Defense, did it not?

Mr. DAVIS. Yes, sir.

Representative PRICE. You mean it is the policy in research now to wait until something else is proven a success to go ahead with another project?

Mr. DAVIS. I doubt if it is the policy.

Representative DURHAM. Did the Secretary of Defense okay this?

Dr. LIBBY. That is my understanding.

Representative HOLIFIELD. What can be learned by this that cannot be learned by the development of a central station power reactor?

Mr. DAVIS. Quite a bit. One of the features of this, as I mentioned, was the fact that we have never connected up two nuclear powerplants to a single propulsion shaft and this, of course, is a completely different requirement than any central station powerplant. Secondly, there are——

Representative HOLIFIELD. Do you mean by that you are going to connect the one that is out there now, the prototype of the submarine, and this? Or are you going to build a dual-type reactor?

Mr. DAVIS. This will be a prototype. It will be a dual reactor system with a single set of propulsion machinery driving a single shaft.

Now the control characteristics of this type of system are as yet unexplored, and also the problem of space and weight and so forth in a naval propulsion unit is vastly different than in a central station powerplant where you do not basically concern yourself about the space or about the weight of the equipment.

It is a rather difficult job to design this system and come within the present weight specifications of conventional power propulsion plants on a large ship.

Representative DURHAM. Will the Department of Defense in any way supervise this?

Mr. DAVIS. I would certainly say that the Chief of the Naval Reactor Branch, Admiral Rickover, of course, has the dual responsibility in the Atomic Energy Commission and the Bureau of Ships, so that liaison with the Department of Defense on the requirement is exercised at least in part through this channel.

Representative DURHAM. Will all the funds come from AEC or part from DOD?

Mr. DAVIS. The funds for the prototype will come entirely from AEC funds.

Representative HOLIFIELD. Did you say that Admiral Rickover is going to be the consultant on this particular job?

Mr. DAVIS. He is in charge of it.

Representative HOLIFIELD. In charge of it?

Mr. DAVIS. Yes, sir.

Representative COLE. Let me just say I am not at all impressed with either the military justification of a surface ship atomic reactor nor with the economic justification for one. I cannot visualize the need or military usefulness of a surface ship that can be pushed by atomic energy.

The witnesses before us here today are not perhaps qualified to comment on the military need for it, except perhaps General Fields might, and I would like to invite his personal opinion with respect to the usefulness of atomic surface craft military operation, or, if he is in position, to give the economic justification for it. But, at any rate, before we do pass on it, I would like to have Admiral Rickover come down and give us the benefit of his views.

Representative HOLIFIELD. I would like to have the subcommittee explore the justification of this from the military people who have made this requirement.

Do you have anything to add to the present testimony, General Fields?

Mr. FIELDS. I do not have anything to add to the present testimony.

Representative COLE. Do you see a military need for a ship that has the capacity to run on the surface without stopping?

Mr. FIELDS. I have not thought of this problem, sir, considered the requirement for it. I would beg to defer from answering.

Representative COLE. I respect your position. I think perhaps it is asking too much to ask you to make comment on it.

Representative PRICE. Mr. Chairman, in connection with Mr. Cole's question?

Representative HOLIFIELD. Go ahead.

Representative PRICE. Could this be made a combination project—merchant ship and naval vessel?

Mr. DAVIS. It is far higher power than would be required for a merchant ship.

Representative PRICE. Could you make your preliminary configurations in this—instead of putting it out at Arco, put it in a merchant ship? Would not that give you the answers?

Mr. DAVIS. It would be much too large and too powerful for an existing merchant ship.

Representative HOLIFIELD. Is this committee then to expect another request to come up for this from the Bureau of the Budget for an additional appropriation for this merchant ship that has been announced?

Mr. FIELDS. Yes, sir. We have in process now—and we are working with the Maritime Administration and with the Bureau of the Budget—the question of processing additional request for authorization for the merchant ship.

Representative COLE. How much money is involved?

Mr. FIELDS. This is a point that is still under discussion.

(Discussion off the record.)

Representative COLE. This item of $25 million in the current budget request for a surface reactor, is that the full job or just the initial cost?

Mr. FIELDS. This $25 million here?

Representative COLE. Yes.

Mr. FIELDS. I believe that is the total authorization request for that project.

Mr. DAVIS. That is correct.

Representative COLE. That may be the total authorization request——

Mr. FIELDS. For construction only, sir.

Representative COLE. I am speaking of the total that will be requested for completion of the project.

Mr. FIELDS. For construction only.

Representative HOLIFIELD. Prototype.

Mr. FIELDS. Prototype.

Representative PRICE. Prototype ship or reactor?

Mr. FIELDS. Prototype reactor for this $25 million.

Representative HOLIFIELD. Mr. Allardice.

Mr. ALLARDICE. How does this reactor differ from the reactor in the *Nautilus* other than a higher power?

Mr. DAVIS. It is considerably higher power per unit; probably will use a different type of fuel element; probably will be of considerably improved performance from the point of view of steam conditions.

Mr. ALLARDICE. It is a pressurized water reactor?

Mr. DAVIS. It is proposed to be a pressurized water reactor. But the whole problem of adapting it to a surface ship is quite different than that in a submarine. The problem of your shielding and things of this nature which are handled one way in a submarine must be handled entirely differently in surface ships.

The control problem I have already mentioned, which is considerably different. The method of control of the reactor itself in terms of the control systems and control elements, use of burnable poisons and things will probably be quite markedly different.

Representative COLE. It may be different, but is it not true, or will you not agree, that there are much less difficult problems in adapting an atomic reactor to a surface craft than to a submarine?

Mr. DAVIS. Perhaps not quite as difficult, but the feeling seems to be this is still a very difficult job.

Representative COLE. What is so difficult about it? If you can do it in a small congested limited area, why do you not know you can do it where space and weight limitations are not of major importance?

Mr. DAVIS. There are still considerable weight limitations and there are considerable space limitations, unfortunately, even in a large surface ship.

The space requirements again are quite comparable. We are talking here about pieces of equipment that are beginning to be comparable in size to those of the pressurized water reactor at Shippingport, and here we have the largest pressure vessel that has been fabricated, and I believe something like 26 feet high. When you try to put several of these in a large surface ship you still have very considerable space problem, and also a considerably more severe problem of shielding and containment.

In the submarine you have a readymade pressure vessel into which this whole propulsion plant fits, and in a surface ship you have to make other arrangements to carry this out.

Representative COLE. You mean, then, space becomes a problem?

Mr. DAVIS. It is still a problem?

Representative COLE. Only to the point of anticipating whether you are going to have any space left for cargo.

Mr. DAVIS. Yes, sir.

Representative COLE. I mean, the extent to which there will be space available for cargo.

Mr. DAVIS. Yes.

Representative PRICE. That is just the exact opposite of what we always anticipated in the atomic propelled ship—that we would make more space available for cargo.

Mr. DAVIS. We hope it will. In a large surface ship you are using a very large amount of power even as compared with the submarine.

Mr. ALLARDICE. How do the pressures and temperatures of this reactor system vary from those of the PWR?

Mr. DAVIS. We have not settled on the final conditions, but it is anticipated that they would be, with respect to pressure and temperature, probably about the same, but that one would probably go to a more advanced type of system insofar as control is concerned.

(Discussion off the record.)

Mr. HAMILTON. A bit of history and then a question.

When we shifted from the CVR to the PWR it was at least the understanding of some people involved that the PWR would be carried forward without any naval hardware and without effort to compress the plant into the type of space requirements that the Navy had. But as far as the proving in of the technical side of the system was concerned, the PWR would still satisfy the naval requirements as a prototype, and if the Navy subsequently came back and wanted a large ship reactor of aircraft carrier reactor, or any other type of surface vessel, the financial burden for the development of the necessary compression of the system into Navy space requirements would be a Navy obligation and not an Atomic Energy Commission obligation, and that beyond the PWR the funding of something such as a prototype large ship reactor would, in fact, be up to the Navy.

Can anyone talk to the relationship which has come about since that time?

Mr. DAVIS. I have, I am sorry to say, no knowledge of this particular statement. But I believe I am correct in saying this would be a pretty long extrapolation. It is not a simple job of adapting PWR technology.

One might argue that the Navy should pay for it, but it is still a very good-sized development job in its own right.

Mr. MCCARTHY. I do not recall that there was ever a stipulation that the Navy would fund the large ship reactor. The Commission was advised that budgeting for the project this year should be handled through normal budgetary channels. We did budget for it, the matter was discussed with the Bureau of the Budget, and the request is for authorization to appropriate the required funds to the Atomic Energy Commission. Again, I do not recall that there was any contrary stipulation when the CVR project was abandoned.

Mr. HAMILTON. I do not mean that limitation had ever been in writing either. I think it was a matter of discussion at the time. But this does raise the whole question of how many prototypes of how many different systems is the Commission to fund for the military. Is the Commission to fund the building and carry forward the development of this prototype for every application that the military is interested in? Or is the Commission only to carry the obligation of working out systems which can be adapted by the military at their own expense to their own specific application.

Representative DURHAM. I think in the case of weapons it applies up to the point of delivery. I do not see the distinction.

Mr. HAMILTON. It has been argued the Commission should carry the obligation for funding through a point where the workable systems that can lend themselves to various applications for a service are perfected but from there on they should get the money themselves.

Mr. DAVIS. It was our understanding with the Department of Defense that we will fund for prototypes and the Department of Defense will fund for actual working seagoing and airgoing models.

I might cite one instance in which we are not building a prototype. That is in the case of the so-called SFR reactor, a small reactor—2 in last year's shipbuilding program and 2 in this year's shipbuilding program. These are substantially smaller reactors than the STR. And since this case is a very straightforward adaptation of the STR technology, it was concluded that no prototypes are necessary, and the Navy is paying the development costs and the costs of construction of powerplants for submarines.

Representative DURHAM. Would we get any benefit out of this from learning something about the use of more power in this field of private enterprise? Would we not get some benefit in building reactors for the development of power?

Mr. DAVIS. Yes, sir; I believe every time we build one of these reactors that we learn a great deal, and on each succeeding one we are always striving to come up with better fuel elements, with better methods of control, pushing to the hilt on temperatures and pressures as far as possible. Some of these rather small differences are fairly hard to come by.

A small difference in temperature, for example, in the core of a reactor may increase the rate of corrosion by a rather large rate. So in one of these we do go to much more advanced designs insofar as technology permits. This has benefit both to the civilian reactor program and the naval program.

Mr. HAMILTON. I realize you get benefit from any advanced reactor projects you carry forward. But the more reactor projects which we assume, spread over the larger number of applications, the less concentrated the effort on those which carry higher priority.

(Discussion off the record.)

Mr. DAVIS. I was going to mention Air Force expenditures which are very large. Also the fact there are certainly differences in the types of systems that you are working with here.

If we build simply an aircraft reactor as an experiment, it operates for a very short time. They are basically small and very difficult types of reactors to construct. They are completely different in time basically than the large ship reactors.

Mr. HAMILTON. As far as the competition for engineers and physicists and people who staff the laboratories, and for the available time and available space in the development laboratory facilities, they are very much the same. It is an anomaly to look at the two budget items.

Mr. FIELDS. This is correct, if you look at plant and equipment items, but I believe if you look on the operating side of the budget, the ANP program is larger for the first time this year than naval propulsion activity in the operating budget.

Mr. DAVIS. That is correct. Additionally, in the case of the ship reactor, I believe it is something like $19 million of that which will not be costed until the subsequent fiscal year. This is an authorization request.

Representative HOLIFIELD. Mr. Allardice.

Mr. ALLARDICE. Did I understand that you testified this was to be built at Arco?

Mr. DAVIS. Yes, sir.

Mr. ALLARDICE. And have you selected a contractor?

Mr. DAVIS. Yes, sir.

Mr. ALLARDICE. Who is the contractor?

Mr. DAVIS. Westinghouse.

Representative COLE. Upon what basis did you select Westinghouse rather than GE or some other contractor?

Mr. DAVIS. They are the prime contractor for construction of the facility as well as for the development work on the LSR. They are not necessarily the prime contractors for the construction itself. They have the overall responsibility for LSR project and selecting an architect engineer and then will select a construction contractor to actually construct the project. They have not selected either an architect engineer or construction contractor.

Representative HOLIFIELD. I think it is a fair statement to say this subcommittee is greatly more interested in seeing the aircraft nuclear program pushed than we are the surface ship, and I would not lay the keel to this ship until you get this appropriation.

Go ahead, Mr. Hamilton.

Mr. HAMILTON. I am just interested in the contracting procedure here. Can you explain why an overall cost-plus-fixed-fee contract is given to Westinghouse for development of the large ship reactor, but on other projects that have been coming along recently the detailed engineering design and construction is being let on a so-called competitive basis, throwing the engineering side of it into competition over and above the contrary objections of the code of ethics of the engineering profession?

Mr. DAVIS. In this particular case, details of the project simply are not in hand. This is a development project, and it is intended that the construction of the prototype go along with development work. Under these conditions it is not possible to specify in sufficient detail the scope of the architect engineering work or the construction work.

Mr. ALLARDICE. Mr. Hamilton is asking why you sent letters out of Schenectady to some 150 people soliciting bids, so to speak, as to how much they would contribute toward the establishment of a third submarine reactor facility. Why not use the same procedure on LSR, for example?

Mr. DAVIS. The LSR——

Mr. ALLARDICE. If that is a good procedure. I do not want to imply it is.

Mr. DAVIS. I believe it is a good procedure. In the first place, the LSR project has been established for some time and before we have tried this other.

Secondly, the main reason for going out and seeking a third contractor for the SRS project was that existing contractors are pretty well loaded up with work, and we believe that we need a third basic naval propulsion contractor.

Mr. ALLARDICE. In other words, Westinghouse was busy on the LSR, so you had to go out and get someone else for the submarine work?

Mr. DAVIS. That is part of what they are busy on; also the SRS, a relatively small project as compared with others, and we thought in getting another contractor in that it would be better to start out on a relatively small project as compared with a very large one.

Representative DURHAM. In what year did we establish this project?

Mr. DAVIS. The LSR project?

Representative DURHAM. Yes.

Mr. DAVIS. During fiscal 1955. I do not recall the exact date.

Mr. FIELDS. 1954.

Representative HOLIFIELD. Are there any further questions on this? If not, go on to the "Submarine Advanced Reactor."

Mr. DAVIS. The Submarine Advanced Reactor again calls for development and construction of a prototype. This work is being carried out by the General Electric Co. at Schenectady, and it is proposed that the prototype be built at the West Milton site. In this case the prototype would probably be included in a section of a submarine hull rather than in a large sphere as the SIR prototype.

Representative COLE. You had such remarkable success with the submarine reactors, both GE and Westinghouse, why do you still feel it advisable to build land prototypes before they are put into the craft?

Mr. DAVIS. There are quite a number of reasons why the prototypes have thoroughly justified themselves.

In the first place, in building a prototype you learn a great deal about the engineering difficulties of the system that you are constructing the first time. In many cases, quite apart from the core of the reactor itself. You find out what you have done incorrectly in designing and constructing it, and you have an opportunity to correct these things before you build an actual seagoing ship.

It provides an opportunity to train personnel. You train them under conditions which are much less hazardous than training personnel on an actual submarine or even on a surface ship at sea.

I think this is a procedure which in my opinion has paid off very well in terms of the real success of the actual working article as compared with the prototype itself.

Representative COLE. The reactor that went into the *Nautilus* is substantially the same as the one that was built out at Arco, is it not?

Mr. DAVIS. There are about 2,009 changes in——

Representative COLE. Material?

Mr. DAVIS. Some of them material, some of them minor; not all of them necessarily for the betterment. A few of them have been for the worse. But there are a very large number of design differences.

The STR Mark I has served to train the crew. It will continue to serve as a facility for developing longer life cores and better methods of control for the *Nautilus*, and we are using it to try and develop even a basically different type of fuel element.

Representative COLE. We can understand it is going to be necessary to train people, particularly with respect to the operation of each one of these various reactors as they come along in the future? It seems to me there is enough similarity and commonness between reactors that once a person is trained on one type of reactor he will be skilled

with some slight additional training to operate a different type of reactor.

Mr. DAVIS. I believe this is partially true, Mr. Cole. On the other hand, I think all of these reactors are considerably different in terms of control, interrelationship between the reactor and the propulsion machinery.

In addition, as the number of actual nuclear-powered craft increases, there is an increasing demand for numbers of people to be trained.

Representative DURHAM. In other words, you started off with a Ford and are now trying to get into another class; is that right?

Mr. DAVIS. Now trying to build a Cadillac.

Representative HOLIFIELD. Is this advanced reactor substantially different from the *Nautilus* and *Seawolf*?

Mr. DAVIS. Yes, sir. It operates at much higher temperature, considerably higher pressure, and less weight per shaft horsepower.

Representative HOLIFIELD. Mr. Allardice.

Mr. ALLARDICE. Is it significantly substantially different than the large ship reactor?

Mr. DAVIS. Yes; I would say it is quite different. The type of fuel element contemplated, again, is quite a different type, and the type of control is probably going to be different.

Representative HOLIFIELD. Is the type of coolant and the type of fuel element substantially different than the *Nautilus*?

Mr. DAVIS. The coolant is water, which is the same, and the type of fuel element is totally different.

Mr. HAMILTON. Is there any particular explanation of why the Knolls Laboratory at General Electric has been asked to develop a submarine advanced reactor, which is a pressurized water system, when all of GE's previous technology has been in the sodium field and all of Westinghouse's experience has been in the field of pressurized water? This would appear to have some suggestion in it that this project was predicated as a pressurized system in order to keep GE in pace with Westinghouse in the pressurized water field. Is there any ground for such an allegation?

Mr. DAVIS. I think, first of all, it is not desirable to have only one place that works on pressurized water reactors. However, GE was given the job of deciding what would produce a reactor for a submarine with the desired specifications insofar as performance is concerned, and their choice was this higher temperature, higher pressure water reactor.

Mr. HAMILTON. Was there any indication in their choice they were attempting to obtain an opportunity at Commission expense and Navy expense to develop a line of technology they did not possess?

Mr. DAVIS. No, sir.

Mr. HAMILTON. How do you police against that?

Mr. DAVIS. May I point out they have considerable opportunity on water-cooled reactors.

Mr. HAMILTON. That is radically different.

Representative HOLIFIELD. Could I interrupt to ask you to clarify a statement you made? Did GE make the decision as to this type of a reactor or did AEC make the decision as to this type?

Mr. DAVIS. My understanding is GE recommended this type of reactor, sir; we approved it.

Representative HOLIFIELD. Would you state that GE should make that decision, or would you state that the AEC should, with its back-

ground of experience, which must be greater than GE's, and its access to scientists that are in its own employ, and so forth? It seems like to me this is a decision that AEC should have made.

Mr. DAVIS. We agreed with them. I think if we had not thought they had come up with the right decision, we would have overruled them. We concurred in their selection of this type of reactor as meeting the performance specifications.

Mr. HAMILTON. Has the Commission ever explored the possibility of having the type of system for any given reactor application made a matter of responsibility of the National Laboratories, which are more independent and more directly responsible to the Commission, than by private laboratory organizations operated by commercial contractors interested in future business?

Dr. LIBBY. We get our advice from our National Laboratories in all of these things. I think the answer to your question is "Yes; we do this normally."

Representative HOLIFIELD. Is it presented to them as a fait accompli or presented to them for consultation in the preliminary stages?

Mr. TAMMARO. In the STR, for instance, the water cycle was picked by Argonne and all of us together, the blessing of all three. The other I am not familiar with.

Mr. HAMILTON. What National Laboratory considered the system desirable for application in additional submarine called the SAR before GE made a recommendation?

Mr. DAVIS. My understanding is—and I am sorry I am somewhat hazy on this—I believe Argonne has carried on studies of an advanced submarine reactor.

Mr. TAMMARO. I know they have.

Mr. DAVIS. Which were at least a part of the basis which GE used to choose this particular type of reactor for the SAR.

Representative HOLIFIELD. Mr. Allardice.

Mr. ALLARDICE. We note that $360,000 has been expended or obligated for the engineer's design and estimate costs. Under what authority has this been obligated?

Mr. MITCHELL. We have regularly followed the practice, Mr. Allardice, of considering that architect-engineer services are not part of the construction. We have limitations on construction, of course, in our various appropriation bills, and regularly over a period of years have considered, and the Appropriations Committees have been aware of this—that we have done our preliminary AE work as planning but not in the context of starting construction.

Representative COLE. Is it not necessary you have that information from the preliminary AE work in order to know what to make a request for in funds?

Mr. MITCHELL. Yes, sir; I think it is.

Mr. FIELDS. That is correct. And where a large amount of research and development had been going on under appropriations in the operating budget, I think it would follow we would do this too.

Mr. ALLARDICE. Is not that a little different, though, than architect engineering for a specific project?

Mr. FIELDS. It is different, but my point was that we have had appropriated moneys that have been expended in research and development in the past, that we visualize requesting authorization here, and that it was architect engineering fees to determine the specifics of this so we could present them in the budget.

Mr. ALLARDICE. Was the $24 million figure arrived at after the $360,000 was expended and the plans formulated and such?

Mr. FIELDS. I am not sure.

Mr. MCCARTHY. I do not believe they were all expended by any means.

Mr. ALLARDICE. Then is not that argument that you have to have architect engineering before you can come in for authorization rather specious?

Mr. MCCARTHY. This is true in some cases.

Mr. ALLARDICE. This is the case in this instance.

Mr. MCCARTHY. This is not the case on the Submarine Advanced Reactor.

Mr. ALLARDICE. Let me ask: Is this $23,140,000 figure the result of the $360,000 architect-engineer expense?

Mr. MCCARTHY. On the Submarine Advanced Reactor, it is not. The architect-engineer contract has not yet been let.

Mr. ALLARDICE. Has not yet been what?

Mr. MCCARTHY. The contract has not yet been let. In other words, the architect-engineer has not been picked as yet.

Mr. ALLARDICE. I thought GE had been picked on this.

Mr. DAVIS. GE is responsible for the SAR project but has not yet selected the architect-engineer for construction.

Mr. HAMILTON. Does the selection of the pressurized water system for the Large Ship Reactor, the Submarine Fleet Reactor, and the Submarine Advanced Reactor have any implications or prospects in the Commission's mind for the sodium system used in the Submarine Intermediate Reactor at West Milton?

Mr. DAVIS. No. I think the situation is fairly simple, and we have just this last month actually gotten the SIR prototype into operation. It is now operating at approximately 1 kilowatt and will be up to full power in perhaps 4 to 6 weeks. We know that the water reactors are quite successful. When we get similar experience with the liquid metal cooling reactors we may decide they are equally successful.

Mr. HAMILTON. Is there any possibility by making so many commitments along the Pressurized Water Reactor system for Navy craft we are making an advance commitment on the type of atomic powerplant used for the Navy, obviating the possibility of the use of the sodium systems which were originally thought to offer longer time promise and get ourselves into a situation where we have a system which is not the most attractive of the two available but to which we are committed because of the size of the commitment we made very early?

Mr. DAVIS. There is always a possibility of this, but, in general, you make the best decision that you can at the time and do not keep waiting for something better to come along.

At the present time the pressurized water reactors, we know, are successful and the best types we know at the moment.

If we were to make a similar decision a year or 2 years from now, we might make a different decision. We had to make the decision during the past year.

Representative HOLIFIELD. It is now 4:45. I think we will meet possibly Wednesday morning. We will let you know in the morning.

(Whereupon, Monday, May 2, 1955, the subcommittee adjourned to reconvene at the call of the Chair.)

AUTHORIZING LEGISLATION

MONDAY, MAY 9, 1955

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
SUBCOMMITTEE ON AUTHORIZING LEGISLATION,
Washington, D. C.

The subcommittee met at 10 a. m., pursuant to call, in room F–88 of the Capitol, Hon. Chet Holifield (chairman of the subcommittee) presiding.

Present: Representatives Holifield, Durham, and Cole; and Senator Hickenlooper.

Present also: Corbin C. Allardice, executive director of the joint committee; and Walter A. Hamilton, member of the professional staff of the committee.

Representative HOLIFIELD. The committee will be in order.

Mr. Fields, I understand you have some material which you wish to put in the record.

Will you identify it and present it at this time.

STATEMENTS OF DR. WILLARD F. LIBBY, ACTING CHAIRMAN; THOMAS E. MURRAY, COMMISSIONER; K. E. FIELDS, GENERAL MANAGER; R. W. COOK, DEPUTY GENERAL MANAGER; A. TAMMARO, ASSISTANT GENERAL MANAGER FOR RESEARCH AND INDUSTRIAL DEVELOPMENT; WILLIAM MITCHELL, GENERAL COUNSEL; DON S. BURROWS, CONTROLLER; W. KENNETH DAVIS, DIRECTOR, REACTOR DEVELOPMENT DIVISION; DR. T. H. JOHNSON, DIRECTOR, RESEARCH DIVISION; DR. C. L. DUNHAM, DEPUTY DIRECTOR, BIOLOGY AND MEDICINE DIVISION; JOHN A. DERRY, DIRECTOR, DIVISION OF CONSTRUCTION AND SUPPLY; ADM. H. G. RICKOVER, REACTOR DEVELOPMENT DIVISION; BRIG. GEN. D. J. KEIRN, REACTOR DEVELOPMENT DIVISION; AND F. J. McCARTHY, Jr., ASSISTANT CONTROLLER FOR BUDGETS, UNITED STATES ATOMIC ENERGY COMMISSION

Mr. FIELDS. I believe Dr. Libby, sir, would like, if it is all right with you, to make an opening statement.

Representative HOLIFIELD. All right.

Dr. LIBBY. Mr. Chairman, just before resuming the review of the individual projects in our request for authorization, I would like to call your attention to the Commission's letter to Senator Anderson of May 5, in which we request that the total amount of appropriation authorization be increased by $21,500,000, making a revised total for which we are requesting appropriation authorization of $315,215,000.

Mr. FIELDS. Mr. Chairman, could I at this point ask that this letter be inserted in the record.

Representative HOLIFIELD. It will be received.

(The letter referred to follows:)

UNITED STATES ATOMIC ENERGY COMMISSION,
Washington 25, D. C., May 5, 1955.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR SENATOR ANDERSON: On April 9, 1955, the President directed that high priority be assigned to the project of building a nuclear powered merchant ship. The directive called for implementation of the program under the coordination of the Chairman of the Atomic Energy Commission in collaboration with other interested departments and agencies. This is the project referred to in our letter to you of April 22, 1955.

In carrying out the President's directive it has been determined that the Maritime Administration, Department of Commerce, will be responsible for the construction of the hull and that the Atomic Energy Commission will be responsible for the construction of the reactor, providing the propulsion machinery and the installation of the reactor and propulsion machinery in the ship. In order for the Commission to secure funds for this program from the Congress, authorization of appropriations for our portion of the project will be necessary under the provision of section 261 of the Atomic Energy Act of 1954. The cost of the work to be performed by the Atomic Energy Commission is estimated at $21 million.

In the early part of April the Secretary of State, after discussions with the Chairman of the Commission, offered to the Philippine Government as a gift of the United States a research reactor subject to the conclusion of an agreement for cooperation between the two countries and appropriation authorization and funds therefor. The Philippine Government on April 19, 1955, accepted the offer of the United States.

In order that there may be no delay in the construction of the reactor after the agreement for cooperation is concluded with the Philippine Government, appropriation authorization and appropriations for the reactor will be required. Although the type of reactor has not been finally determined, a swimming pool type is contemplated at an estimated cost of $500,000.

We request that the above items, totaling $21,500,000, be included in the draft legislation authorizing plant and equipment appropriations for the fiscal year 1956, which is now pending before your committee. The inclusion of the above amount would bring the total request for appropriation authorization to $315,250,000.

Sincerely yours,

W. F. LIBBY, *Acting Chairman.*

Dr. LIBBY. The additional amount requested provides funds for 2 items: The first, in the amount of $21 million, being the Commission's portion of the nuclear powered merchant ship project on which the Research and Development Subcommittee of this committee held hearings on last Thursday afternoon. The second item provides for the construction of a research reactor in the amount of $500,000 which this Government would present to the Republic of the Philippines.

Both of these items would be included in our reactor development program which I assume you will take up this morning. We could cover these two items now or later on in the program, whichever you may wish.

Representative HOLIFIELD. We will get to that later, I believe.

Mr. FIELDS. This morning our staff provided your staff data sheets and analysis of these two items for your use.

Again with respect to our total authorization request, since the submission of our May 5 letter, just this last one, a change has occurred in another item, which is shown on page 25 of the analysis of the bill as conversion of pilot plant to production plant, Fernald, Ohio.

The amount for this project is listed at $2 million, but this can now be reduced to $600,000. This reduction would make the revised total appropriation authorization figure $313,850,000.

(Discussion off the record.)

Mr. FIELDS. In a new subject, in the course of our hearings last Monday, there was discussion of how we segregate operating costs and plant and equipment costs, and I would like to provide your staff with a statement for their use, and some backup material that they might find useful, sir, and I will make note of that fact in the record.

Representative HOLIFIELD. It will be received.

(The letter referred to follows. The accounting manual referred to in the letter is on file with the Joint Committee.)

BASIS FOR SEGREGATION BETWEEN OPERATING AND PLANT AND EQUIPMENT ITEMS

Shortly after the Commission was established it installed a comprehensive accounting system following the pattern used by industry. This system integrated budgeting with industrial-type accounting. In so doing, costs were segregated into the two general classes used by industry, i. e., operating costs and capital outlays.

The segregation of budget items between expense and capital costs was made initially in the budget for the fiscal year 1951 with the approval of the Bureau of the Budget and the General Accounting Office. In its budgeting and accounting, the Commission follows the industrial pattern of capitalizing only those items which have significant value and which will have a continuing use over a period of years.

Under this concept we expense the cost of research items which are fabricated or assembled only for the purpose of proving out a process or theory and which will have no further use as a research tool or production facility after the results are known. Such items are, therefore, chargeable to the operating expense appropriation although it should be noted that the costs of buildings and other facilities used to house them are capitalized and funded under the plant and equipment appropriation if they can be used for other research or production purposes.

For budget purposes, the determination as to whether such items are to be charged to plant and equipment or to operating expenses must be based on the use and purpose intended at the time the estimate is prepared.

Examples of items included in the operating budget are: (1) Test facilities (towers, etc.) which are expected to be demolished in tests; (2) experimental gadgets which have no longtime use; and (3) pilot equipment which will not produce material quantities of product.

It is our opinion that the practice followed is in accord with sound accounting principles and which are used in private industry. Attached for your information are copies of parts of our accounting manual which set forth the principles for determining what items are to be capitalized.

Mr. FIELDS. There was discussion last Monday with respect to the Oak Ridge Hospital. We have a letter which the Chairman is sending to you, sir, that I would like to take note of, which brings out the salient features of this project, namely, that in our estimates there is indication that the cost of the new facility would be recovered in 10 years after completion of construction through savings in operating cost and maintenance of the new building and through deferral of certain maintenance expenditures on the present building during the 3 years required to construct the new hospital.

That statement brings out the points as to the relationship of this project to the entire community disposal problem at Oak Ridge. We would hope that you would find this letter of use, sir. I will give it to you.

Representative COLE. Frankly, I do not find it of any use whatever, when I realize that in order to build this hospital it is necessary for the Government to go out and borrow the money, and that is going to cost just as much as your savings will amount to, to borrow that money. So this business of coming in and saying that "We are going to save the cost of this hospital over a period of 10 years" just is not a fact.

Representative HOLIFIELD. This is a matter that is of particular interest to Senator Gore, and I suggest that you submit your letter at this time, and we will return to it later when Senator Gore is present, because he specifically asked that he be notified when we consider this further.

Mr. FIELDS. There was also a discussion——

Representative COLE. He is not going to have to resubmit it.

Representative HOLIFIELD. No. We will return to it for discussion when Senator Gore is here to comment on it.

(The letter referred to follows:)

ATOMIC ENERGY COMMISSION,
Washington, D. C.

Hon. CHET HOLIFIELD,
Chairman, Subcommittee on Authorizing Legislation,
Joint Committee on Atomic Energy, Congress of the United States.

DEAR MR. HOLIFIELD: We would like to clarify and amplify our testimony of May 2 regarding the need for a new hospital at Oak Ridge and the relationship of this facility to proposed legislation for disposal of the Oak Ridge community.

The Oak Ridge Hospital was constructed in 1943 as a temporary wartime structure with an initial capacity of 50 beds. Due to the rapid growth of the Oak Ridge population, a number of wings were added to this facility during the next 2 years to increase its capacity to approximately 300 beds. This resulted in a facility which is inherently uneconomical to operate; and since it is for the most part of temporary construction, it is increasingly costly to maintain.

As indicated in the data transmitted to the Joint Committee on Atomic Energy in connection with our request for authorizing legislation for plant and equipment for fiscal year 1956, the Commission is faced with the need for a continuing subsidy for the hospital operation, as well as increasing costs for maintenance and periodic rehabilitation, unless this facility is replaced by a new structure. Our studies indicate that the cost of a new facility would be recovered in 10 years after completion of construction through savings in operating cost and maintenance on a new building, and through deferral of certain maintenance expenditures on the present building during the 3 years required to construct a new hospital. Therefore, it appeared to be in the interest of economy to request authority for this facility in our regular 1956 appropriation.

Of equal importance is the significance of this project to the Commission's proposed program for disposal of the Oak Ridge community. The legislation which has been drafted to implement this program is now in the hands of the Joint Committee on Atomic Energy for its consideration. This program can succeed only with the cooperation of the residents of Oak Ridge, who must take voluntary action to assume responsibilities for community services which for the last 8 years have been borne by the Commission. A key consideration in the minds of community leaders and the Commission is to turn over the public service facilities in good enough condition so that the recipients will be able to start operating them without having to face the additional problem of immediate capital outlay, and the need for continuing Federal contributions to meet operating deficits will be minimized.

The residents of Oak Ridge regard the project to construct and donate a new hospital to the community as an integral and essential part of the total community disposal program and have repeatedly raised this matter in discussions regarding community disposal.

Representatives of the CIO and the AFL at a meeting with the Commission in August 1954 specifically mentioned the deep concern on the part of organized labor groups at Oak Ridge, over the prospect that continuing operation of the present hospital would increasingly jeopardize the health and safety of its occupants. A strong plea was made for construction of a new hospital.

Failure to provide for a new hospital could, we fear, have a real effect on the attitude of the residents to the entire matter of disposal of the community. In any event, it would probably affect our ability to dispose of the hospital operation since the board of trustees of Oak Ridge Hospital, Inc., the nonprofit corporation which operates the facility, has indicated, in a letter to the Chairman to the Joint Committee on Atomic Energy dated June 10, 1954, that the board might refuse to accept transfer of the present hospital upon community disposal, but would undertake to carry on the operation of a new hospital without any continuing annual subsidy.

The proposed community disposal bill does not provide in the annual payments to be made to Oak Ridge any funds to subsidize the operation of the hospital. In other words, the disposal legislation has been drafted on the assumption that a new hospital, which could be operated without subsidy, would be provided to the community.

If the Commission is to divest itself of responsibility for community services at Oak Ridge—an objective repeatedly urged by the Joint Committee—it must be prepared to make a proposition to Oak Ridge residents that will appear reasonable to them, as well as equitable to the Federal Government. It is the Commission's view that construction of a new hospital at Oak Ridge will eliminate the need for an annual operating subsidy, and will facilitate the transfer of this operation to the community; whereas, if a new hospital is not provided, the Commission may not be able to divest itself of this operation within the foreseeable future.

The Commission is aware that donation of a new federally owned hospital to a local community may be unprecedented. However, Federal ownership and operation of a complete city—the fifth largest in Tennessee—is without precedent, as are many features of the plan proposed for its disposal. The $2,900,000 hospital donation must be viewed in the larger perspective of the total disposal plan for Oak Ridge, which calls for donation of over $35 million worth of Federal property to local entities, together with sale of real estate which it is estimated will yield proceeds of $42 million.

Sincerely yours,

W. F. LIBBY, *Chairman.*

Mr. FIELDS. There was also a discussion on Monday of more specific language with respect to the power reactor development acceleration project in the amount of $25 million. This is item 1 on the analysis of the bill, and I have a brief statement that I would like to read at this time for insertion in the record.

An important national objective is the early attainment of competitive nuclear power. To this end the AEC is accelerating the development of nuclear reactors in its own laboratories, and by cooperation with private enterprise. We anticipate that this acceleration of nuclear power development will require the availability of capital funds for the following purposes:

1. The construction by the Commission of prototype experimental or demonstration reactors of a type which industry is not prepared to construct with private funds.

2. The addition to or alteration of Government installations to carry out special research and development or other services required by both the Atomic Energy Commission and private power reactor programs, and to provide facilities necessary for experiments, tests, chemical processing, and other technological activities arising out of advanced reactor design or the development of advanced components of reactor systems.

3. Joint projects with industry where the Atomic Energy Commission might build and own a portion of the plant in the interests of furthering development at reduced Government costs.

It is estimated that $25 million will be required to be used for these civilian applications of power reactors. All plant and equipment acquired therefrom will be the property of the Commission.

The theoretical and practical knowledge thus obtained by the Commission will be available for general dissemination, subject only to the appropriate security restrictions.

That concludes the matters I had, sir.

Representative HOLIFIELD. I have letters here from Senators Watkins and Bennett of Utah, to the subcommittee, dealing with the subject of access roads and furnishing us some information, and a plea for the passage of the item in the appropriations. If there is no objection, we will receive them and have them printed in the record at this point.

(The material referred to follows:)

UNITED STATES SENATE,
COMMITTEE ON THE JUDICIARY,
May 6, 1955.

Hon. CHET HOLIFIELD,
Chairman, Subcommittee on Authorizing Legislation,
Joint Committee on Atomic Energy, Capitol Building,
Washington 25, D. C.

DEAR REPRESENTATIVE HOLIFIELD: Congressman H. Aldous Dixon and I have had some correspondence with State and county road officials in our State on the need for a continuation of the uranium access-road program.

We have incorporated these viewpoints of the officials affected into a joint statement which is enclosed herein. I trust that you will be able to incorporate this brief statement in the record in support of the Atomic Energy Commission's request for authorization to expend $4,165,000 for uranium access roads under the Commission's plant and equipment program for fiscal 1956.

With all best wishes.

Sincerely yours,

ARTHUR V. WATKINS.

JOINT STATEMENT OF SENATOR ARTHUR V. WATKINS AND REPRESENTATIVE H. ALDOUS DIXON

MAY 6, 1955.

SUBCOMMITTEE ON AUTHORIZING LEGISLATION,
JOINT COMMITTEE ON ATOMIC ENERGY,
Room F-88, Capitol, Washington 25, D. C.

GENTLEMEN: On behalf of uranium producers and State and local governmental agencies of the State of Utah, we strongly urge that the Joint Committee on Atomic Energy approve the Atomic Energy Commission's request for authorization of $4,165,000 for continuation of its uranium access-road program during fiscal year 1956.

In order to determine the interest of the operating prospectors and miners in this program, we asked the Utah Mining Association to make a canvass of those individuals within the State. The association reported that the Utah uranium producers affirmed, with considerable unanimity, that the "need for uranium access roads continues to be serious." They reported that many new operations have been started recently in areas which were previously isolated and that access to them by very primitive roads is extremely difficult, especially in wet weather.

The Utah uranium producers reported that the need for the Federal Government's access-road program is probably greater at this time than at any other time in the past, in view of properties actually operating. They also pointed out that with the uranium exploration program still in high gear, that it is anticipated that there will be many new deposits found, thereby increasing the need for access roads.

The Board of Commissioners of San Juan County, which contains some of the largest producing uranium mines in the country, warmly applauded the role of the AEC-administered access road program in the past. "These roads are of great value to the miner and prospector, whether they operate on a large scale or a small one," the Commission wrote. "In fact, a great number of small operators would be forced to discontinue mining if they did not have these roads over which to haul their ore to markets or mills * * *."

The San Juan County Commissioners emphasized the problem of roadbuilding and maintenance faced by the sparsely settled counties in the uranium producing

areas, as follows: "San Juan County is so large and so sparsely settled that the assessed valuation is low, so that we do not have much revenue from taxation for roadbuilding. We depend almost entirely on Class B road money received from the State for our roadbuilding and maintenance. Yet we do not have nearly enough money to maintain and build the roads necessary for the development of the mining industry."

Similar expressions were received from the Grand County Commission.

Problems faced by the State of Utah in building and maintaining roads in the extensive, sparsely settled uranium area were described by Chairman H. J. Corleissen of the State Road Commission of Utah, as follows:

"The Bureau of Public Roads recently completed a study as to needs of our trunkline roads which serve the uranium mining area in southeastern Utah.

"The main road traversing this area is U. S. 160, which is on the Federal Aid System, and which, due to the heavy increase in traffic and heavy truckloads of ore and supplies, has necessitated the expenditure of a considerable sum of money on this road, amounting to $1,585,000 during the past 3 years, which includes a new bridge over the Colorado River, now under construction and costing $549,000. In addition, we have now programed another $1,115,600 to replace 5 bridges of insufficient load-carrying capacity and approach roadways. Also, in addition to this, there is needed improvement at an early date of 12.4 miles of road that now has very severe alinement, and construction of 2 major bridges, which is estimated to cost $1,140,000.

"It is not anticipated that any Atomic Energy funds will be made available for improvement of U. S. 160, and the above entire burden will rest with the State.

"The remaining State roads in this area, totaling 330 miles, which are the Moab-Castleton road, the LaSal Junction-Colorado road, the Monticello-Arizona Road, the Blanding-Hanksville Road, and the Hanksville-Green River Road, were estimated by the Bureau of Public Roads to cost $7,473,000 to bring them to a minimum standard for the serving of the uranium mining areas, which, in our opinion, is an absolute minimum and probably should be increased by at least 40 percent.

"In accordance with the analysis of the Bureau of Public Roads, Utah's responsibility for the improvement of these roads was $243,000 per year, which is the maximum amount of funds that this State could provide on these roads. It is, therefore, obvious that if these roads are to be improved to adequately serve this mining area, Atomic Energy funds in the amount of at least $2 million per year should be made available. This amount is exclusive of the development roads leading off these trunkline roads which serve the actual mining area.

"You are correct in assuming that inasmuch as the counties in this area are very sparsely populated, and with the rough terrain over most of the areas, which requires heavy expenditures for the construction of roads, that the counties can contribute very little in the construction of the roadways, other than in the assistance of the maintenance of the same after construction.

"It is, therefore, my opinion that every effort should be made to have a substantial appropriation made to the Atomic Energy Commission for road construction, if the mining areas now under development are to be properly served and enabled to mine and deliver the ore."

From our own knowledge of this vital uranium-producing area, we concur in the opinions expressed by our fellow Utahans and request that the Joint Committee on Atomic Energy continue this access-road building program on the level recommended, as a vital contribution to the country's search for and production of domestic uranium ores.

Sincerely yours,

ARTHUR V. WATKINS,
United States Senate.
H. ALDOUS DIXON,
House of Representatives.

UNITED STATES SENATE,
Washington, D. C., May 6, 1955.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
United States Senate, Washington 25, D. C.

DEAR CLINT: I am writing the committee in connection with your current hearings on the request by the Atomic Energy Commission for authorization to construct uranium access roads.

I understand that of a total of $4,165,000 it is proposed that about $364,000 be allocated for the construction of new roads in Utah, and about $819,500 would be used in Utah for improving and maintaining existing access roads. In addition to this, Utah's estimated contribution would be about $53,000. The program for Utah would affect about 122 miles of access roads.

The proposed total of more than $4 million represents a considerable increase over last year's program, and I believe it demonstrates recognition of the important role this road program plays in making available the vast stores of uranium ores located in certain western States. Utah's share of the total has not been increased proportionately, however, and State highway officials indicate that about $2 million would be necessary to meet the needs of the State's uranium mining areas.

Most of these roads are in sparsely populated areas and pass through rugged terrain, and what in normal conditions would be a proper State responsibility becomes a burden which the Federal Government must share in order to meet our domestic uranium requirements. This program has proved its worth and has insured a steady and increasing flow of ore. Without the program, many of our sources would still be undeveloped.

I urge your committee to support this request of the Commission in order that we might realize optimum development of the Nation's supply of this all-important ore.

With kindest personal regards, I am

Sincerely,

WALLACE F. BENNETT.

Representative HOLIFIELD. At this time I think we will return to this letter which has been placed before the subcommittee, to Senator Anderson from Dr. Libby, in regard to the $21 million appropriation for the merchant ship reactor and the $500,000 appropriation for the Philippine research reactor.

This was presented just before you came in, Congressman Durham and Congressman Cole. Do you have any questions on that at this time? Are there any comments?

Representative COLE. Let me inquire, what consideration has been given to using one of the existing Liberty ships or merchant ships, of which we have hundreds tied up in mothballs?

Dr. LIBBY. We considered it at some length, and perhaps I should ask Mr. Davis to give you that explanation, but my understanding—and I have asked the question—is that it costs the same amount, in both time and money, to build a new one.

Representative COLE. To reconvert an old one would cost as much in dollars and minutes as to build a new one?

Dr. LIBBY. Yes, sir. It does seem strange, but that is the answer that apparently is the right one.

Representative HOLIFIELD. There is no ship at this time being built on the ways, and no hulls being laid, that could be used?

Dr. LIBBY. Is that true, Mr. Davis?

Mr. DAVIS. It is our understanding that there is not, and we did discuss with the Maritime Administration at some length the relative advantages and disadvantages, costwise, and timewise, of constructing a new hull or using one of the existing hulls.

It is the joint consensus that there is little to be saved in the way of either time or money by using an existing hull, since rather major alterations are required and you have to go in and not only install new equipment, but take out the old equipment, in the case where you would use an existing hull. That would involve major structural changes.

Representative HOLIFIELD. What is the estimate for a complete ship, outside of these items that are outlined here?

Mr. DAVIS. I do not know that I have the numbers in there. As I recall, the Maritime Administration estimated around $12,400,000, approximately, for the total cost of the hull, exclusive of the $21 million. Of this, something of the order of $8 million or $9 million was for the hull, and the fitting out of the hull.

Dr. LIBBY. I think on page 2 of this analysis of the item, you may have some numbers, Mr. Holifield, along that line.

Mr. FIELDS. That is with respect to the reactor and the propulsion plant.

Representative HOLIFIELD. That is the $21 million item.

Mr. FIELDS. Yes, sir.

Representative HOLIFIELD. The reactor plant is $16.5 million, and steam plant equipment is $2 million. That would be roughly, then, around $32.5 million—pardon me, it is $33,400,000.

Mr. FIELDS. Yes; that would be $33,400,000.

Representative HOLIFIELD. Are there any questions on that?

Representative DURHAM. We had an open hearing on this item, I believe, on Thursday afternoon, and I would suggest that you incorporate the hearing in the minutes.

Representative COLE. I do not care to renew my discussion of this subject and repeat what was said at that hearing Thursday afternoon. I am not yet convinced that this is a sound, practical, helpful, and constructive idea in any degree. However, recognizing that it might have some value, I am endeavoring to persuade myself that the expense of $35 million is worth while.

It is true, is it not, Dr. Libby, that you plan to use the same reactor that the *Nautilus* has?

Dr. LIBBY. Essentially the same.

Representative DURHAM. We are up against the same thing here that we have run up against several times before, that there is an item that probably has its usefulness in the development of power for naval vessels, and we have got to begin somewhere if we ever expect to do anything with it. I feel very much like Congressman Cole, that it is kind of a venture proposition, I would say.

Mr. FIELDS. It seems to me it has to be accepted as a part of the atoms-for-peace program, primarily. I think there will be some benefit in getting another agency, the Maritime Administration, working in the program for the first time. How much one advances the reactor art, though, is a question. But it will probably advance their experience, certainly with the handling of such propulsion machinery in merchant ships.

Representative HOLIFIELD. I noticed you used the words "part of the atoms-for-peace program." What did you mean by that?

Mr. FIELDS. It is primarily a demonstration that it is a fact that you can propel merchant ships with nuclear propulsion, and that it can be done. There would be an illustration to the world that this is a fact.

Representative HOLIFIELD. Do you think this is more of a demonstration than a submarine? It is apparent that if you can produce an engine reactor which will propel a submarine, that you can also produce one that will propel a ship. Do you see any advantage to be gained by that?

Mr. FIELDS. I understand this is the purpose behind it, the belief that you will influence men's minds by a merchant ship going around

the world and calling at different ports, more than one would with a submarine, which is an instrument of war.

Representative DURHAM. I would like to ask Mr. Murray, in the face of his statement of Thursday afternoon, have you convinced yourself yet, Mr. Murray, of the usefulness of this project?

Mr. MURRAY. I never faced up to the usefulness of this project, Mr. Durham, when I refrained from voting on it. At that time I took the stand that I did not have enough information before me to reach a judgment.

Now I believe that this directive is all wrong, and that is my present belief. Maybe in studying the data that has been given to me since last week, I may change my mind. I think that if we were given a little time, and a little chance to do a little more studying on this, we could come up with a very much better proposition than sticking or putting a *Nautilus*-type reactor in a ship. I feel that the logical and sensible way to proceed with a job like this is to put two reactors in a ship, but the directive is worded in such a way I do not think we would be able to do it.

We have a time schedule there of 24 months to 30 months. There are things of that kind to organize, in not a leisurely but a sensible, businesslike way, to go at this job. It appears to me it is just a rush job, to grab a hull of a ship and take a reactor, and stick it in a hull, and don't think about economics and continuous operation; just do the job and get it done in 20 months and get it on the high seas and send it around the world.

As Mr. Cole has said, there is no question in my mind that it has a certain amount of public relations value, but in any reactor that you build it is going to advance the art. General Fields has said here this morning that you will be training crews, and you will be getting the merchant marine people more familiar with reactor work, and all of those things will help. But if you had 6 months or a year more on this program, I think you would do a much better and a much more constructive job.

I think the money would be well spent, and we would be learning something in the reactor field, and advancing ship propulsion.

That is generally my feeling.

Representative DURHAM. Why do we not let this item lay over for a few days, and we can put it in the bill. I am not entirely ready at the present time, and I am not convinced that it is a proper thing. If we are going to do it, if it costs more money, let us do it right, whether it takes 2 reactors or 1.

Mr. MURRAY. It is more or less a matter of the time schedule. You have to get a reactor, and you have to start building it, really, immediately in the case of that reactor. So that design is frozen under this present directive.

Representative DURHAM. We can direct some up here, also, if necessary.

Mr. MURRAY. I appreciate that, but you asked me for my opinion, and that is about the way I look at it at the moment.

Representative HOLIFIELD. Unfortunately, I was not able to get away from another committee and attend the meeting, and I am at a little bit of a disadvantage at the moment as to what went on at the meeting. I have not had a chance to read the transcript.

We are taking no votes on any of these items today in the committee, and I suggest that we just proceed. We can pass this as soon as the questions are finished, and go on to the next item.

Representative COLE. What do your studies show to be the cost of a conventional merchant ship of the Mariner-type ship?

Mr. DAVIS. I do not have any good figures. The Maritime Administration do have costs, but it is my understanding that it is in the neighborhood of perhaps 8 or 9 million dollars for one of the Clipper or Seafarer-type ships which are the ones they are proposing as a replacement for the existing dry-cargo ships.

Representative COLE. Is that a complete cost?

Mr. DAVIS. That is the complete cost of the hull and the propulsion plant.

Representative COLE. What did you say just a minute ago, in assessing the total cost of this new ship?

Dr. LIBBY. $33.4 million.

Representative COLE. Of which $21 million is reactor, and $12 million is the ship. Why should it cost more for this ship than for the other ship?

Mr. ALLARDICE. Mr. Chairman, if I remember the figures correctly, from the Maritime Administration, they said $9.5 million for the hull, and the additional money for design, plans, preparation of designs, and so on.

Representative COLE. What I am trying to arrive at is how close will this *Nautilus* reactor in a merchant ship come to being even remotely competitive with the conventional merchant ship? That is what I am trying to arrive at. Is there anybody you know of, in any place, who can give any reasonably close estimate?

Dr. LIBBY. Not close. We have estimates.

Representative COLE. I mean reasonably close. Tell me what you have by way of estimates.

Dr. LIBBY. Mr. Davis, would you like to talk about this?

Mr. DAVIS. I think it is fairly clear that this will not be economical, either from the point of view of construction or, for quite some time, from the point of view of operation. After a period of time, if we are able to develop cheaper cores, and cores of longer life, we would hope that the cost of operating the ship would not be greatly in excess of the cost of operating a conventional ship.

However, it is true that in order to have a possibility of being economically competitive, you must design a reactor which will be of a somewhat different type. You see, the basis of our present estimate—there is no hope that this present reactor can operate as cheaply as a conventional ship. The reason for this is that the STR has an enriched reactor core, and when you are burning up U–235, this U–235 is expensive. In order to get the advantage of reduced fuel costs, you have to go to a regenerative reactor where you are replacing that with plutonium. In order to go to that, you should be able to get one where the fuel costs, in terms of fissionable material, are less than the oil costs in a conventional ship. This is a type that is really fundamental to getting the operating costs down to a competitive range.

Representative COLE. Why do you say that the operation of this ship will cost more than the conventional ship, and then come in and say that the consumption of the enriched material which is used costs

about the same as the fuel that would be used in conventional ships? They do not match up, the two statements.

Mr. DAVIS. There is the cost of fabricating the core.

Representative COLE. We are talking about operation, and you said the operation of this ship would cost more than a conventional ship.

Mr. DAVIS. What I was trying to point out was that the cost of the basic material, the fuel that we burn up, is roughly comparable, but added onto that, of course, is the cost of fabricating the core.

If you take that into account, your present-day costs of fabrication, this very much increases the difference.

Representative COLE. It does not have any influence on the cost of operating the ship, does it, how much it costs to fabricate the core?

Mr. DAVIS. Yes, sir.

Representative COLE. And the reactor.

Mr. DAVIS. Yes, sir, because you have to keep replacing the cores, and once having used one up, you have no way of recovering this fabrication cost, and we would look at the cost of the core as being a part of the operating costs.

Representative COLE. When you speak of the enriched material as being of comparative cost with the oil consumed, you are not speaking of the entire fuel element of the reactor, then.

Mr. DAVIS. I am speaking here only of the U–235 that is actually burned up.

Representative HOLIFIELD. What is the difference between the $21 million estimated cost of the reactor plant, and accompanying equipment, and the conventional type of steam plant you place in the hull?

Mr. DAVIS. The conventional type of plant would cost probably in the neighborhood of $3 million as compared with the $21 million.

Representative HOLIFIELD. There is at least an $18 million overage there in capital investment.

Mr. DAVIS. That is right.

Representative HOLIFIELD. So, of course, in figuring the cost of operation, you would have to take into consideration the expenditure of that $18 million additional, from an amortization standpoint or interest equivalent, over its lifetime period, would you not?

Mr. DAVIS. That is correct, sir.

Representative HOLIFIELD. How near are we, from the standpoint of engineering design or conception, to evolving a different type of reactor, Dr. Davis, which would produce some plutonium to offset the cost of operation?

Mr. DAVIS. This is quite parallel to the problem of designing small powerplants, whether they are for shipboard use or shore use, in the range of, let us say, fifteen to perhaps twenty-five thousand kilowatts of electricity. This is a size range which we have not done a great deal of development work on so far. I would expect at the moment that we would be inclined to go to either a pressurized water type reactor, with some kind of a blanket type of core arrangement, perhaps something similar to what is being developed for the PWR, or perhaps to a boiling water type of reactor, which we feel can probably be built at relatively small size, relatively economically as compared to some other types of reactors.

Representative HOLIFIELD. You have let a contract for a small military type reactor, have you not?

Mr. DAVIS. The Army Package Power Reactor.

(Discussion off the record.)

Representative HOLIFIELD. What type of a reactor is that?

Mr. DAVIS. That again is a small pressurized water type of reactor.

Representative HOLIFIELD. It will be the type that might be, by modification, used in this type of operation, will it?

Mr. DAVIS. No, sir; it is quite similar to the *Nautilus* reactor in the sense it is a pressurized water reactor, and it would suffer from the same disadvantage of not regenerating any material. So if we were to try to design and develop a reactor for this specific purpose, we would not go in that route.

(Discussion off the record.)

Representative COLE. When did you order the reactor for this?

Mr. FIELDS. Mr. Cole, we put orders to start the core fabrication on Thursday morning, immediately following the hearings on Thursday.

Representative COLE. What did you do Wednesday?

Mr. FIELDS. I have forgotten the date of the meeting.

Dr. LIBBY. We ordered the core, sir.

Mr. FIELDS. On Thursday morning there was a meeting at which the Commission approved ordering the fabrication of the core to start. Now this was to proceed with it. And following a meeting on Thursday afternoon, we rescinded that order, and no action has been taken since that time. It is at a standstill basis at this time.

Representative COLE. Have you ordered the movement on the Large Ship Reactor to go ahead, and submarine reactors, and all of these other items that you are now seeking authority to move on with, have you ordered those, too?

Mr. FIELDS. I cannot answer that question. I do not believe so, sir. Development work has been going on on those in the 1955 development program, on the operating side. I do not believe the construction of the prototypes has been initiated on those. Is that correct? That is, in either the Large Ship Reactor or the submarine advanced reactor.

Dr. LIBBY. It should be made clear, Mr. Cole, that the core is not the reactor itself. The core also is of the *Nautilus* type, and although they would not want to put it in the *Nautilus* because of improvements, it could be so used, and it would not be a dead loss if we fabricated it and did not build the merchant ship reactor.

Representative HOLIFIELD. What percentage of the $21 million would be for the core?

Dr. LIBBY. I think the core is about $3.5 million for each of them, and they run 2 years, or something like that. That is not in here. You asked how much it was.

Mr. FIELDS. That is not in here.

Representative HOLIFIELD. That would be in addition to the $21 million.

Dr. LIBBY. That is a load of fuel which would presumably run the ship about 2 years.

Representative COLE. Why is it not in the cost of the reactor?

Mr. FIELDS. It is certainly a part of the total cost, sir. It is the fuel cost, however, and it would not appear in our plant and equipment budget, but it is a part of the total cost. Your total cost of that

project should have added something like $3.5 million, that is, for the initial core. It would be a part of the operating costs.

Mr. ALLARDICE. Is this true of all of the reactor projects in this budget, in this authorizing budget, that there are no funds for the core?

Mr. FIELDS. That is correct. The core is something that you make and you burn up, and you expend the fabrication costs, and you have to recharge it. It is the same thing as loads of gasoline at various times or fuel oil to run these ships, or airplanes if it is airplanes.

Representative COLE. I understand the Maritime Commission is going to operate this ship and reactor.

Mr. FIELDS. Yes, sir; that is the plan.

Representative COLE. Has the Maritime Commission made application to the Atomic Energy Commission for a license to do this?

Mr. FIELDS. I do not believe they have as yet, sir.

Representative COLE. Is it contemplated that they will?

Mr. FIELDS. It would be contemplated; yes, sir.

Representative COLE. Is there any other way the Maritime Commission can operate the ship except under a license from the Commission?

Mr. FIELDS. I do not believe there is, sir.

Mr. MITCHELL. I think that that is right. If the Commission wanted to continue to concern itself with the operation, it might be done as a contract; but if the Maritime Commission took it over, it would have to have a license. And it was pointed out to the Commission on Thursday morning that this was so.

Representative COLE. They have not yet made such an application.

Mr. FIELDS. No, sir.

Representative COLE. I understand the decision made by the National Security Council to proceed with this project was based on some studies which the Commission made. Are those studies available?

Dr. LIBBY. These studies are available; yes, sir. They were rather hurried things. Do we have copies of them?

Mr. FIELDS. We have copies of them; yes.

Representative COLE. Who made the study?

Mr. FIELDS. The Reactor Development Division made these studies.

Representative COLE. In making that study, did you collaborate with counterparts of the Maritime Administration with respect to maritime engineering?

Mr. DAVIS. Yes. We had discussions with them about the various types of ships, and the requirements. I might say that the studies were not finalized except in the form of the report which was sent to the National Security Council, and our own staff papers.

Representative COLE. What do you mean by that?

Mr. DAVIS. There are no separate forms.

Representative COLE. You finalized the form but not the contents?

Mr. DAVIS. The contents were not bound up in to a report of any sort, except the documents themselves.

Representative DURHAM. Why did not the Maritime Commission put these funds in its operating budget to cover this item?

Dr. LIBBY. You mean the core money?

Representative DURHAM. The hull. We are getting a dispute on that.

Mr. FIELDS. The answer to that is that there was discussion and consideration of this point, that the Maritime Administration would budget for the entire project. It seemed that the principal purpose of this, however, being a demonstration that you could do this, and as a part of the atoms for peace program, that it would seem more reasonable that both the Commission and the Maritime Administration budget for their parts. So it was principally, really, so that this committee could look at it.

Representative DURHAM. Then the directive went to them, as well as to you, did it not?

Mr. FIELDS. It went to all agencies, sir, with the Chairman of the Atomic Energy Commission named as the coordinating agent for all agencies involved in it.

Representative DURHAM. I was just thinking about the jurisdictional trouble we have when we get into another committee's field of authority. I think we might be questioned on that on the floor of the House unless we make it very plain that it necessarily had to go to the Commission.

Representative HOLIFIELD. The hull section of the project would be in the Maritime Administration, and we would have nothing to do with that. As I understand, all we would be interested in would be the reactor plant as we have it outlined here, $21 million, and a core at $3,500,000. And the core would not, or the machining of the core and its cost would not come before this authorization subcommittee. It would go in your operation budget.

Mr. FIELDS. The Appropriations Committee, that is right.

Representative HOLIFIELD. That would bring the cost of the item up to around $36,900,000 for the total, including one core.

Mr. FIELDS. Including one core; yes, sir.

Representative HOLIFIELD. That would last for 2 years?

Dr. LIBBY. Roughly. Is that about right?

Mr. DAVIS. It depends on how much the ship is used.

Mr. FIELDS. That depends on how much the ship travels.

Representative HOLIFIELD. That is pretty expensive traveling, $3.5 million for 2 years. Have you estimated how far the ship could travel? Certainly it would not travel very much if it was on exhibit in these different ports.

Mr. FIELDS. That is correct.

Representative HOLIFIELD. Yet you estimate, even with limited travel, that it would cost $3.5 million for 2 years.

Admiral Rickover, I am sorry I was not at the meeting on Thursday, and I do not want to ask you to go through your testimony again, but have you given any thought to this subject, as to the advisability of using this type of a reactor rather than an improved type?

Admiral RICKOVER. Mr. Holifield, I do not think that is a question which I should properly be asked, because the decision has been made by the executive agency to do this job, and the job is to be done with dispatch for a certain purpose. If you are going to get the job done fast, there is no other recourse but to use the *Nautilus* reactor. That is all I can say.

Representative HOLIFIELD. How much time would you estimate it would take in addition, to design a more advanced type of reactor which might be more economical?

Admiral RICKOVER. I think with about another 2 years, you could develop a reactor which would be more suitable for merchant shipping. You see, you are facing this fundamental issue: The fuel costs for the life of a merchant ship, a typical tanker, is about $7.2 million. I got this figure from the Maritime Commission a couple of years ago.

Representative HOLIFIELD. How many years is that?

Admiral RICKOVER. Twenty years. This is based on 600 barrels a day at $3 a barrel. They figure that the initial machinery plant cost was $2.5 million, and the fuel cost for the life of the ship would be $7.2 million, to make roughly $10 million for the machinery cost for the total life of the ship. So if you want to get into economics, this is a pretty quick and rough estimate of what your relative economics are right there. You have a $10 million cost for the plant, plus the fuel cost for 20 years. They figure on running 200 days a year. This is for an 18,000 horsepower ship.

Representative DURHAM. How many reactors have already been authorized this year for the Army and Navy that you have to build?

Admiral RICKOVER. The Army has one, sir. That is the package power unit, and that is let. That is all that is authorized. For the Navy we have—you are talking about brandnew ships, and not about replacement types?

Representative DURHAM. I am talking about brandnew types.

Admiral RICKOVER. I was coming to that. One is the large ship reactor.

There are three different types, for different purposes.

Representative DURHAM. We are going to get into a priority of building these reactors.

Admiral RICKOVER. Yes; with this merchant ship we are already in a priority, and it will delay the Navy program in doing this job.

Representative HOLIFIELD. In other words, this will take the place of the *Sea Wolf*?

Admiral RICKOVER. It won't take the place of anything, but it will result in delay.

Representative HOLIFIELD. In delay.

Admiral RICKOVER. Yes.

Representative COLE. I would like to have the names of the folks in the Commission, in both Commissions, Maritime and Atomic Energy Commission, who made the staff study. Dr. Davis is one, and can you tell us who the rest were in your own group?

Mr. DAVIS. There is Mr. Robinson, and Mr. Dupkin, and Mr. Staebler was involved in it at one stage. The people we talked to in the Maritime Administration at various times have been Mr. Rothchild, Mr. Morse, Mr. McMullen, Mr. Sullivan, Mr. Dennison, and Mr. Russo. Those are the ones I recall offhand.

Representative COLE. Was there any disagreement among that group of people, either in your own or the combination with Maritime, who entertained any serious reservations regarding the project, or was there general concurrence and approval of the idea?

Mr. DAVIS. Our position was that we were looking into how it would be done, and after it was decided that it should be done, we accepted the directive that we should go ahead. So we have been spending our time ascertaining the best manner in which to proceed.

Representative DURHAM. Unless it gets into a priority—this may be an unfair question, Doctor, but I think we might just as well get

down to some of these difficult things we must face—was the President advised of all of the jobs we have to do this year on the reactors?

Dr. LIBBY. What is that?

Representative DURHAM. Was the President fully advised on that?

Dr. LIBBY. Yes, and the directive makes it very clear that we are not to allow this program to substantially interfere with the military propulsion program, and that is our intention.

Representative DURHAM. It puts the responsibility right back on us, if we get into a war and we do not have any submarines.

Dr. LIBBY. We are not going to build this ship at the expense of submarines, or the airplane, or any of the military programs. Our advice is, however, that we have a very good chance of doing this without substantial effect, and not anything material in 24 to 30 months.

Of course, we may not make it, but this is our advice, and this is the terms on which we present this to you. We are not going to interfere substantially with those military programs. If we do, we are going to fall down on it.

Representative HOLIFIELD. I find it hard to reconcile your statement, Dr. Libby, with that of Admiral Rickover. He says that this will result in delay, and you say that the terms on which you are presenting it are that it will not.

Dr. LIBBY. These are our orders.

Representative HOLIFIELD. Your orders are that it should not result in delay?

Dr. LIBBY. That is right, sir.

Representative HOLIFIELD. But is it not true that you are going to have to give a great deal of time to it, and you are going to have to pull in quite a few scientists on this? Do you have such a plentitude of topnotch scientists that you can pull them in and off of these other projects?

Dr. LIBBY. No; there is not a lot of development work in it. You know, it is a matter of fabricating the core, the same way you did it once before, and there is not so much new.

In the ship end of it, there may be some new things that I do not know about, but as far as the reactor and the propulsion is concerned, there isn't really a great deal of development work in it.

That is for two reasons: One is, the time does not allow development work; and the other is that we have just determined that we are going to go ahead as fast as we can, and this does not allow development work to any great extent.

Of course, you will be able to put in whatever developments you can, the things you have learned since the STR-type reactor was built. We will incorporate those. But the manpower, or the high-level manpower requirements are at a minimum as far as nuclear engineers are concerned. We hope and we think that that is true.

Representative DURHAM. Did the Chairman of the Maritime Commission testify that they had already requested the funds in their budget for this year?

Dr. LIBBY. They are coming up this week before the authorization committee, I think it is tomorrow, or one day this week, and they intend to request that. That was Mr. Morse, the Administrator of the Maritime Administration. He is the head of it, I think.

Representative DURHAM. If they do not get the hull, we had better get these things together.

Dr. LIBBY. Oh, yes.

Representative COLE. Did the Commission approve this before it went to the National Security Council, or afterward?

Dr. LIBBY. No. Mr. Strauss told us about it, and it was born in a great hurry, and he told us individually, or at least he told me.

Representative COLE. It was born in a great hurry?

Dr. LIBBY. We did not approve it before it went to the National Security Council.

Representative HOLIFIELD. Did Mr. Strauss inform you about this before it was announced by the President, Mr. Murray?

Mr. MURRAY. Yes; but I knew nothing until April 6 about this study, of course, that was going on.

Representative HOLIFIELD. You mean the study in the Commission?

Mr. MURRAY. That is right. I knew nothing about that until April 6.

Representative HOLIFIELD. When was the study started, do you know?

Mr. MURRAY. I haven't any idea.

Representative HOLIFIELD. When was the study started, Mr. Davis?

Mr. DAVIS. The best I can recall, it was about the end of March, the very last of March.

Representative HOLIFIELD. When were you informed, Mr. Murray?

Mr. MURRAY. I would have to refresh my memory, but as I recall it, the National Security Council met on the 7th of April, and I think the President signed the directive or authorized the directive on the 9th of April; and on the 13th of April we had a meeting called, at which there was a paper on the agenda, on which we were supposed to take some action. It panned out that that particular paper was a four-page document, and it was the same as Mr. Strauss had presented to the National Security Council as his personal views.

Before the Commission acted on the paper that was on that agenda, this directive from the National Security Council was presented.

Representative HOLIFIELD. Mr. Strauss presented not the views of the Commission to the National Security Council, but his personal views?

Mr. MURRAY. Backed up by the report of our staff.

Representative HOLIFIELD. Backed up by the report of the staff, but was it backed up by the other members of the Commission, or just his personal views? Was it a Commission action?

Dr. LIBBY. It was not, sir. As a matter of fact, I think there was no Commission meeting in the interim. There may have been, but it was not a Commission action.

Representative COLE. Is this the fact—and I am trying to fix some responsibility and determine who it is that has made the decision to go ahead with this thing: The National Security Council and the President and the Commission all concur in the endorsement of this proposal?

Dr. LIBBY. Yes.

Representative COLE. And that is supported by staff studies of both the Commission and the Maritime Administration?

Dr. LIBBY. Certainly of the Commission. I guess the Maritime Administration has done a staff study, have they not? They must have. Anyhow, the Commission has.

Representative COLE. Mr. Davis was going to say yes or no, but he said "well."

Dr. LIBBY. I do not recall whether that is true.

Mr. DAVIS. This is where I have trouble with the definitions. Certainly we have discussed them, and quite a few people have been called in at various times for their views, and we have had meetings and technical discussions on these things, and these have not resulted, as I pointed out before, in any formal documents or any formal staff studies of the nature of a report, except as they are contained in the documents which we have presented to the Commission.

Representative HOLIFIELD. Dr. Libby, will you submit a copy of the President's directive to the staff for the record, please.

Representative COLE. We have it in the other hearings, I think.

Mr. ALLARDICE. Not the directive.

Dr. LIBBY. I think it was in the record last week.

Representative COLE. You can get it. I thought we had it.

Dr. LIBBY. I do not think we have it with us.

Mr. FIELDS. I am not sure it was in the actual hearings.

Representative COLE. Let me ask Admiral Rickover if, in his personal opinion, based on his knowledge of what has been done in ship reactors, and allowing his imagination to project him into the future, does he envision the time when a nuclear engine, making allowance for the weight required for shielding, and all of that, will be of such proportions as to permit a greater cargo capacity than would be expected from conventional types of propulsion?

Admiral RICKOVER. It is hard to answer a question like that. Let me take a period of 5 to 7 or 10 years, because no responsible person in this game can go beyond that, and I would say no.

Representative COLE. You would say no?

Admiral RICKOVER. Not in the next few years. However, that, Mr. Cole, does not mean that it will not happen. That is the best estimate I can give you today, is no.

Representative HOLIFIELD. I would like to recapitulate the cost here for just a minute. I believe the figure was given us of a 20-year life for a conventional ship at a cost of $7.2 million for operation; is that right, that is, for fuel?

Dr. LIBBY. It was your remark, Admiral.

Admiral RICKOVER. I gave you a figure which I had gotten previously from the Maritime Administration, and it was $2.5 million for the cost of the machinery plant, and this was a couple of years ago, and it is based on $3 oil. That is $7.2 million for the operating on the basis of 200 days a year for 20 years, which is figured normal life.

Representative HOLIFIELD. It is about $360,000 a year.

Admiral RICKOVER. Yes.

Representative HOLIFIELD. If your core lasts 2 years, it would involve a cost for fuel of $1,750,000 a year, according to the figures Dr. Davis gave us, and an average cost of $18 million in the plant, which would have to be, I suppose, amortized. If you put it on a 20-year basis, the amortization of that and the interest on it would run close to another $2 million. So that you come up with about $3,750,000 a year to operate this on the average for fuel as against $360,000. In other words, it is about 10 times the cost, in round numbers, for operation.

Admiral RICKOVER. That is only fuel. Of course, the personnel is going to be much more, because you have to have very highly skilled personnel. The people on the *Nautilus*, some of them have been trained for 4 years, and they were highly selected people. When we got them in, we required that they have 6 years of obligated service. It will take a much higher caliber of personnel and training than you apparently have on the average. This is going to be the real problem. You will probably have to have more. At first blush you think that you will need less, but as was brought out in the seminar we had in Pittsburgh Saturday, on operating the first central station plant at Shippingport, they are going to need more people there, the Duquesne people—and they have their own figures—than you have in a conventional plant. It is going to cost them much more.

So that you are going to have more cost and a higher type of personnel, and you probably will have to have more, and you are going to have to take exceptional measures toward getting permanence of personnel in order to operate the plant properly.

I think this is going to be the biggest problem, Mr. Holifield, and offhand I do not know how that is going to be handled. It is going to take extraordinary measures on the part of the Maritime Commission to get into this feature of it. I think the Maritime Commission is very optimistic about this subject, because they don't know anything about it.

Representative HOLIFIELD. When you say that they are going to have more and better trained——

Representative COLE. Why does he single out the Maritime Commission for being so enthusiastic? Because of their ignorance?

Admiral RICKOVER. That is probably true of great segments of American industry, also.

Representative COLE. There are others enthusiastic about this, too.

Representative HOLIFIELD. You spoke of better trained people. Are you talking about men in the $10,000-a-year class, or $10,000 or $12,000 a year?

Admiral RICKOVER. Every sailor we have operating the *Nautilus* now can go out and get about two times as much as he is getting. It is not $10,000, but probably $8,000.

When you get to the merchant marine, you are talking about an 8-hour day and a 40-hour week, and you are going to have trouble.

Representative HOLIFIELD. How many of these highly trained men are you going to need to run this reactor?

Admiral RICKOVER. To run the ship on a 3-shift basis, with maintenance crews, I would say a minimum of about 40 to 50 people.

Representative HOLIFIELD. Highly skilled people?

Admiral RICKOVER. Yes. You can't have any fool around a nuclear plant.

Mr. ALLARDICE. You mean in the engineroom gang, 50 in the engineroom gang?

Admiral RICKOVER. I think you will need, with your maintenance and operation, let us say 40 people. That is a rough figure. As you understand, I have not been too much involved in this thing, and I have not made any study. I am giving you some offhand figures.

Mr. ALLARDICE. Is that about three times the normal complement?

Admiral RICKOVER. I think about twice.

Mr. DAVIS. There are about 25 in the engineroom crews of these merchant ships.

Admiral RICKOVER. I think 40 would be a conservative figure.

Representative HOLIFIELD. But your average person would have to be much more highly trained than the average engineroom gang, and you would be involved in higher salaries for, you might say, that level.

Admiral RICKOVER. I would say that any man who does any job in the machinery plant on the *Nautilus* is qualified to be an officer, at least, in a machinery space of a merchant ship, and you would at least need that caliber.

The Maritime Commission the other day said less people, but again that is enthusiasm, and I do not believe there is anyone in the Maritime Commission who has ever been on the *Nautilus* yet.

Representative DURHAM. They do not have the same authority of holding personnel that you have in the Navy.

Admiral RICKOVER. That is why I mentioned the 6-year period. We had to get 6 years' obligated service.

Representative DURHAM. He can walk off and get a job after you train him in the merchant marine. It is something to think about.

Representative HOLIFIELD. I am just wondering, looking at your personnel problem there. We do have a ship operating organization within the Government, the MSTS, and I am wondering if, going into the merchant marine with its unobligated labor, you are not getting into the wrong department here. If we are going to operate this as a Government operation, the MSTS is a civilian service type of organization, and yet it is completely within Government control, and it is handled by Government civil service personnel, as I understand.

Representative COLE. But their employment problem would be the same as the Maritime Commission.

Mr. ALLARDICE. Not quite. They are Government civil service, and they sign up for 1 year at a time.

Representative DURHAM. They can resign at any time they want to.

Representative HOLIFIELD. Let us go to the Philippine research reactor, and see if we can get through that.

Representative COLE. For the record, could we have, if it is available, a copy of not only the directive from the President to the Commission on this subject, but also a copy of the report of the National Security Council to the Commission?

Dr. LIBBY. Report to the National Security Council from the Commission, you mean, that is, which the Chairman used?

Representative COLE. Whatever papers were passed back and forth between the Commission and the NSC, and the directive of the President.

Mr. MURRAY. There were no papers passed back between the Commission and the NSC.

Representative COLE. Were there any papers passed to the Commission from the NSC?

Mr. MURRAY. There were papers passed by the Chairman to the NSC.

Representative COLE. Will you send down what papers you have?

Mr. FIELDS. Yes, sir.

Dr. LIBBY. We have quite a good staff study now, and I do not know whether it has been brought down here yet, which is getting better all of the time, and we can give you the backup material on that.

Representative HOLIFIELD. Did the NSC ask that the staff prepare the study originally?

Dr. LIBBY. I do not think so, but I am not sure.

Representative HOLIFIELD. Will you find out if that is true?

Mr. DAVIS. Yes. In the report, I believe dated March 12, there was an item which requested a study by the Commission, but I am not sure of the date.

Representative HOLIFIELD. We can have that request, and the language of that request, too, please.

Representative COLE. In Mr. Murray's statement last week to the committee in executive session, he refers to or he says—

instructions by the National Security Council dated March 12, 1955, were given to the Chairman of the Commission, that an urgent study be made on installing a nuclear propulsion plant in a merchant ship.

That is, he learned of these instructions for the first time on April 6, but those instructions from the Security Council to the Chairman of the Commission, if they were given to the Chairman of the Commission in his capacity as Chairman of the Commission, and presumably they were given to him in that capacity, I should think ought to come to this committee.

(The information referred to is classified and has been filed with the Joint Committee.)

Senator HICKENLOOPER. Have you finished with the ship?

Representative HOLIFIELD. I think so.

Senator HICKENLOOPER. I wonder if you have discussed the comparative cost of a merchant ship reactor and an airplane reactor.

Representative HOLIFIELD. No, sir. We have discussed fully, I think, the comparative costs between the merchant ship reactor and a conventional plant, and we have also discussed——

Senator HICKENLOOPER. What is that cost? Would you bring me up to date?

Representative HOLIFIELD. In round figures, it was $3 million, and the reactor plant would be $21 million without the core, and the core would be $3.5 million, which would run the ship for 2 years. That is a cost of fuel of about $1,750,000 a year, against the conventional cost of an ordinary steam plant of about $360,000 a year.

This does not take into consideration the $18 million additional that the plant costs, and the amortization of it and the interest costs on it, which would run about $2 million a year. Add that to your fuel cost, and it would run about $3,750,000 a year, or about 10 times what it would cost to run a conventional type.

(An AEC cost estimate of the various types of cargo ship reactor installations appears in appendix B, p. 175.)

Representative COLE. Including the capital and operating costs, and assuming a 20-year life, the ratio appears to be, from my little sketches, about 8 to 10 times more for nuclear than conventional.

Senator HICKENLOOPER. Mr. Chairman, I would like to ask the Chairman what priority has been given, if you can classify it as such, to this project.

Dr. LIBBY. It is our intention to push this as hard as we can, bearing in mind that we must not interfere with the military propulsion program in any substantial way.

Senator HICKENLOOPER. Are you giving it priority in your thinking over the reactor for an airplane?

Dr. LIBBY. No, sir. Oh, no. Our orders have gone out on that.

Senator HICKENLOOPER. I realize that the Air Force should be the moving factors in that matter, but are you giving this any more priority than to getting a nuclear-powered airplane in the air?

Dr. LIBBY. No, sir.

Senator HICKENLOOPER. Would you say that you are giving more attention to the nuclear-powered airplane than this, or some other project?

Dr. LIBBY. Yes, much more.

Senator HICKENLOOPER. That is all.

Representative DURHAM. We discussed the priority, Senator, but the problem of the directive is that it directs the Commission to do this, but what disturbed me was perhaps the fact that once this project is put into General Electric or Westinghouse, it would be known as the President's project, and it is going to automatically get priority.

Dr. LIBBY. Our orders are very sharp, and the Commission has the responsibility to see that that does not happen.

Representative DURHAM. That is further assurance.

Dr. LIBBY. I do not know whether it is humanly possible, but we are going to try, I am sure, to carry that out.

Senator HICKENLOOPER. Mr. Chairman, I would just take this opportunity to say what I think, or say again that which we have said many times, that I think this committee is very earnestly insistent that every possible thing be done which can be done within reasonable bounds, to get an atomic powered airplane in the air, and we should have had one in the air now. If the admonitions and insistence of this committee had been followed 7 years ago, we would have an atomic airplane in the air right now. That was one of our pet projects a long time ago, and we have been consistently insistent, and for some reason it is dragging its feet.

I am not saying it is the Commission's fault or I am not saying whose fault it is, but looking at what we thought was very desirable, and what the results are today, there has been something that has happened. I do not know. But I merely take this opportunity to reiterate that feeling, and I think that that is unanimous on the part of the committee. I believe that is so, Mr. Chairman. That is my impression.

Dr. LIBBY. I think you can include the members of the Commission in that, that we must get on with this airplane reactor.

Mr. FIELDS. On that point, may I say that I think your urgings are bearing some fruit, in that for the fiscal year 1956, the operating expenses of the aircraft nuclear propulsion projects in our budget will be larger than any of the other projects therein.

Senator HICKENLOOPER. I will say this: That I am not so impressed by budgets. I am impressed by results.

(Discussion off the record.)

Senator HICKENLOOPER. I realize that there are tremendous difficulties, and I am not unmindful of the fact it is not as easy as snapping

your fingers to get one to fly. I merely hope to take the occasion, every time it offers itself, to reemphasize the fact that I believe this committee is quite restless with the fact that we have not made more progress toward getting an airplane in the air powered by nuclear energy.

That is all, Mr. Chairman.

Representative HOLIFIELD. I think Mr. Allardice has a question.

Mr. ALLARDICE. In the funding of these reactor projects, as I understand it now, you are not including moneys for the fabrication of the core.

Mr. FIELDS. That is correct.

Mr. ALLARDICE. I find it hard to understand. Since the core is such an integral part of a reactor system, how you can separate them?

Mr. FIELDS. It is a recurrent item. With the operation of the project you burn up the core, and you have to take it and reprocess it, and you have these expenses over again for a new core.

Mr. ALLARDICE. I understand that, but do I also understand that you can use, from your operating budget, any amounts of money that you wish, to start building and fabricating any kind of a core you want, without authorization for an end reactor for it?

Mr. FIELDS. We would normally not initiate this well in advance, but let me see. I am not acquainted with the practice which has been followed in the past, and perhaps Dr. Davis or Mr. Burrows should answer this. I am not acquainted with the practice that has been followed on that in the reactors.

Mr. BURROWS. It just would not make very much sense to build a core that you did not have a reactor to go into, so from the standpoint of commonsense we would not do that.

On the other hand, we might well have in the developmental phase a core for experimental purposes, which we might very well do without authorization.

Mr. ALLARDICE. I can understand it as a part of the experimental business; but I fail to understand, when it is an integral part of an operating reactor which requires authorization, how you make a differentiation. It seems to me that this is so intimate to the thing that it should be included under the costing of it.

Mr. BURROWS. The core is just the fuel, Mr. Allardice.

Mr. ALLARDICE. What does authorization mean to this committee or the Congress, then.

Mr. BURROWS. The core is merely fuel, and the authorization of any project does not normally include the fuel as a part of the capital cost. That is charged against the cost of running.

Mr. ALLARDICE. How much of the cost of the core is fuel?

Mr. BURROWS. The whole cost is fuel, including the fabrication of it

Mr. ALLARDICE. How much of it is fuel, and how much is fabrication and machining and manufacturing?

Mr. BURROWS. The cost we have been speaking about now is the fabrication of the fuel. That is what the core is.

Mr. ALLARDICE. I understand that, but that is not fuel. That is work on fuel. That is putting it in a shape to put it in a furnace.

Mr. BURROWS. It is charged against fuel.

Senator HICKENLOOPER. Let me be a devil's advocate. You pay so much for a ton of coal, and you do not break that coal down into

how much it costs to blast it out, and so on. Would that not be about the same here?

Mr. ALLARDICE. But you would pay for pulverizing equipment to put the coal is a suitable form to put it in the fire. There is a carburetor for your engine the same way, and it seems to be analogous.

Mr. BURROWS. The equipment necessary to make the core would be capitalized, sir. I think the problem is just the same as handling any other fuel, whether you have got transportation charges or any processing charges, it is all charged against the fuel.

Representative COLE. I do not know as I understand it, either, Mr. Allardice, and I would not understand it because I was not in the room, but when you speak of the cost of the core, does that include not only the uranium and fissionable material within the core, but also the fabrication and the fashioning of it and the assembling and putting it together as a core?

Mr. BURROWS. The cost we are speaking of now is exclusive of the fissionable material. It is the cost of any alloying that has to be done, and any fabrication to get the material in form for the ship.

Mr. ALLARDICE. In addition to this $3.5 million we are talking about, there is a cost for special nuclear material, also?

Mr. BURROWS. Also.

Representative COLE. That, you cannot estimate?

Mr. BURROWS. Oh, yes, but your cost there would be——

Mr. DAVIS. Several hundred thousand dollars. Only a portion of that is burned up in the use of the core. The remainder is recovered.

Of the other things put into the core, zirconium is one of the largest cost items. That cannot be recovered because it is radioactive, and that is disposed of.

Mr. ALLARDICE. Could we have an actual estimate of what the cost of this ship is; I mean, every time we talk about it we get an additional cost, and it is hard to put your hands on it.

Dr. LIBBY. To make the complete cruise for 2 years, you mean, and not including the personnel or anything like that, but all of the physical equipment. Well, we have $21 million for us, and we have $12.4 million for them, and the cost of the core.

Senator HICKENLOOPER. Who is the "them"?

Dr. LIBBY. The Maritime Administration.

Then we have the several hundred thousand dollar inventory of uranium 235. Now the amount of that which is burned up is pretty small.

Mr. ALLARDICE. You have reprocessing costs to get it back.

Dr. LIBBY. That is right. There is the total. That fits it out to go for 2 years, as I understand it. I get $37.3 million.

Mr. HAMILTON. This is a *Nautilus*-type core. What is the estimated life on the *Nautilus* core which would be placed in this machine, as proven in experimental data so far? This is a steam propulsion system?

Mr. DAVIS. Yes, sir.

Mr. HAMILTON. How does the ship go about generating electricity to its full capacity, as to the full power capacity of the reactor?

Mr. DAVIS. It would not.

Mr. HAMILTON. It would not?

Mr. DAVIS. No.

Mr. HAMILTON. So this ship would not be able to put its electricity into a port area?

Mr. DAVIS. No.

Mr. HAMILTON. And turn on any lights?

Mr. DAVIS. No.

Mr. HAMILTON. It would be solely a propulsion unit?

Mr. DAVIS. No; it would have some auxiliary generating equipment, which would generate the power required on the ship, for the ship's use.

Mr. HAMILTON. Somewhere between 10 and 20 percent of the reactor output?

Mr. DAVIS. Something of the sort. But we would not contemplate putting in it large-scale electric generating equipment to convert the full power of the reactor to power to supply to the shore, or anything of that sort.

Mr. HAMILTON. Was any consideration given in the staff study to making this ship an electric-driven ship so that the power could be converted through rheostats and put on land?

Mr. DAVIS. Not on rheostats.

Mr. HAMILTON. It was done during World War II with some destroyer, and I wondered if this could be done here.

Mr. DAVIS. We discussed this with the Maritime Administration, and we decided because of the large amount of equipment, and the very expensive equipment, required to convert power, first of all, over into electrical power, and particularly to do this at the various frequencies and at the various voltages that would be required, this would be really an impracticable thing to do, particularly since we did not have any knowledge of a situation of that kind.

Mr. HAMILTON. Was the assumption that electric power could be made available in that way in any way a part of the decision originally by either the President or the National Security Council to go forward with this project?

Mr. DAVIS. Not to my knowledge. I believe one time it was mentioned as a possibility, but in our discussions we certainly decided against it.

Mr. HAMILTON. It does not appear in the March 12 instructions?

Mr. DAVIS. No.

Representative HOLIFIELD. Let us take the Philippine reactor now. Will you give us a little information on that, please, Dr. Libby?

(Discussion off the record.)

Dr. LIBBY. We are asking half a million dollars, and we are thinking of something like the machine we are putting in the Convention at Geneva.

I am afraid the figure isn't much firmer than that.

Representative HOLIFIELD. What could you do with this reactor?

Dr. LIBBY. It is a very good reactor. This would allow us to build a duplicate of the machine that we are building at Geneva, which is a swimming-pool type of reactor, and it is a beauty for experimental work of wide variety.

Representative COLE. What are the Philippines going to do with it?

Dr. LIBBY. We hope they will learn how to use it and educate engineers.

Representative COLE. Are there any people in the Philippine economy now who are physicists of any degree of excellence? Do we

have Philippine physicists trained, in other words, and do you have people there who could actually use this?

Dr. LIBBY. No. I think that we have two in their school now. Do you know, General?

Mr. FIELDS. I do not know.

Dr. LIBBY. Anyhow, I have known 1 or 2 Philippine scientists of substantial reputation in my time, but only a small number. The country has a long way to go.

Representative HOLIFIELD. Is this a medical reactor? Could it be used for medical purposes?

Dr. LIBBY. No; this is not that big. It could be used for isotopes.

Representative HOLIFIELD. The thing that disturbs me, in both the Turkish agreement and this agreement, we are making these agreements and obligating ourselves to furnish this equipment to two countries which have little background or skilled personnel to operate them. It seems to me that if we are going to do a thing like this, we ought to be using medical-type reactors in these countries, furnishing them with medical-type reactors so that there would be the humanitarian element involved, rather than this more or less, as I see it, scientific type, which they are not equipped to operate.

Dr. LIBBY. They have, of course, a number of schools in the Philippines, and they do send people over here to school. I am sorry I do not know whether they have students in our present class at Argonne or not, but they will have to have in order to take this project.

The medical reactors are a bit more substantial in terms of money.

Representative HOLIFIELD. But would it not be a bit more substantial in terms of use and in terms of public-relations value?

Dr. LIBBY. It may be a better idea.

Representative HOLIFIELD. I am not against using these things if there is something practical behind them.

(Discussion off the record.)

Dr. LIBBY. This is a very valuable tool.

Representative HOLIFIELD. I know it is, but is there anyone there capable of using it? That is the point. I understand it is a valuable tool.

(Discussion off the record.)

Dr. LIBBY. Perhaps we should think toward a medical reactor. This is a very good engineering and instruction reactor, and that is what it is very good for; in making isotopes it is very good and in making experiments. But it is not a medical reactor, in my opinion. You can not really use it for that purpose. It might find some applications, but we are putting one in at Brookhaven—and what is the cost of that medical reactor? They say it will come to the same money, and I thought it was much more expensive. I am sorry. It is the same money, and I was wrong, Mr. Holifield. It may be a better idea.

Representative HOLIFIELD. If we are going to do these things from the standpoint of international relations, and we are going to have to train people to go over there and operate them, it seems to me that we could be giving some thought along the medical line, rather than along the other line.

Dr. LIBBY. You may be right.

Representative HOLIFIELD. I believe from a humanitarian standpoint, we can say that we are bringing you a reactor to help you people,

to help cure your ills, and it would seem to me it would mean a lot more than to have 3 or 4 ill-trained students play with something.

Dr. LIBBY. It is where you get a beam to irradiate people and to make treatments.

Representative COLE. Could you have a dual purpose one, to make isotopes, and also generate a beam?

Dr. LIBBY. You can make isotopes on any reactor, and you make them on the *Nautilus*, so you can make isotopes on anything.

I think Mr. Holifield's idea of it being better to give a medical reactor is a good one.

Representative HOLIFIELD. It would be simpler to use.

Dr. LIBBY. I thought it would be much more expensive, and I do not know where I got that impression.

Representative HOLIFIELD. If it was twice as expensive, I think it would be worth it.

Senator HICKENLOOPER. Which type of reactor would give the best education and the best training?

Dr. LIBBY. I think the swimming pool is a better one, because you can see things. We chose a swimming pool to go to Geneva, because you can look down in and see the whole thing.

Representative HOLIFIELD. Do you not have a different problem there? We are going to Geneva where there is going to be a conclave of experienced physicists from all over the world, and we have got to have something that has an advanced stage of scientific interest; but in this case why not do something that would be beneficial from a humanitarian standpoint?

Senator HICKENLOOPER. I was just wondering now, on the other side of the question, what is the long-range best value? Is it to start them on an educational program so that they can learn? The long-range educational value of this thing would give them a tool to train some scientists over there, and that might be advantageous international relations.

(Discussion off the record.)

Senator HICKENLOOPER. I think it would be very fine to give them a medical reactor or something they could use for medical purposes, but also something that would teach people.

Representative COLE. Along that line, if the Commission feels that this reactor for the Philippines would be helpful in disseminating knowledge throughout the world with respect to atomic energy and as indicating our readiness to share the knowledge and assistance with anybody who wants it, I call to your attention that it is just simple arithmetic that if that one project is worth while, instead of putting $35 million in a ship you could put one of these reactors in 70 Manilas.

Representative HOLIFIELD. I heartily agree with what the gentleman from New York says.

In response to what Senator Hickenlooper said, I would say that I personally would not be in favor of this, or the Turkish, or the merchant ship project, if I had been asked about it from a practical standpoint. But I am saying if you are going to do these things I think we ought to squeeze the last drop of good out of it, and I think we can do that on a humanitarian basis, because it would be something that would be used every year for medical uses for the people, and the results would probably be more lasting than this other type.

Representative COLE. Let me inquire. I had the impression that Turkey had the skilled technicians and scientists now to handle the reactor that they are getting.

Dr. LIBBY. This will be managed, and by the time she gets that reactor she will have people to run it. That is for sure.

Representative COLE. Turkish citizens, you mean?

Dr. LIBBY. Yes, sir.

Representative COLE. Back to the world ship once more, would you have your people make some little study to see what it would cost to include in this ship a generator and propel this ship with electricity, and when the ship is lying in port, to generate electricity, and then you will have something that is creative and constructive and positive.

Dr. LIBBY. We will do that.

Representative COLE. I cannot believe the additional cost would be too great, that is, in comparison with the present total cost of $35 million, and it would seem to me for a few million more you might include that concept and have something which would be done.

Senator HICKENLOOPER. It seems to me a good idea that you could explore, because you have a dramatic demonstration of this thing in that way, you can run it up to the dock and hook it up and light their town, or a portion of it, for a while. Otherwise, you have got something that nobody can see and nobody can understand, and it is just a lot of machinery.

Dr. LIBBY. It would be very striking to come in and say, "Turn your power station off, and we will run your power needs."

Senator HICKENLOOPER. That would be some demonstrable thing that they could see and feel and handle.

Representative DURHAM. You are getting into an expensive proposition.

Representative COLE. Surely, but if we are going to spend money let us get some dividends out of it, too, or something that we can be sure of.

Senator HICKENLOOPER. The way it appears to me is that if you walk on a ship and they say it has an atomic powerplant and atomic fuel, how do you know? You can only go up and slap your hand on the shield someplace, but that is all you see.

Representative COLE. No smokestacks.

Senator HICKENLOOPER. It runs in the ocean like any other ship.

Dr. LIBBY. We are going to keep the smokestacks off if we can.

Mr. ALLARDICE. I notice that while the Philippine reactor authorization is requested here, there is no authorization requested for the reactor being built in Geneva. These are the same type of reactor. Why is there no request on the Geneva reactor?

Dr. LIBBY. I will let Mr. Burrows answer that, but let me try first.

The Geneva reactor is a temporary thing. The conference is August 8 to August 20 and then we are going to dispose of it.

Representative COLE. As a gift? How do you mean to dispose of it?

Dr. LIBBY. We have not settled that. We are considering trying to sell it to the Swiss.

Representative COLE. I read in the paper where you expect to give it to the Swiss. Whether there was any foundation for that newspaper statement or not, I do not know. But certainly it must have come to the attention of the Swiss Government.

(Discussion off the record.)

Dr. LIBBY. We have been pursuing the matter with the Swiss, and they have not told us that they are not interested in it.

Representative HOLIFIELD. If it is transportable, you might put it up as the one that you are going to send to the Philippines.

(Discussion off the record.)

Mr. ALLARDICE. I still find it difficult to understand where, in section 261, there is anything which indicates the intent of the builder has a variance on the effect of the words. I do not understand this. If you follow this logically, I think you could say that you could built any size reactor and say, "We only intended to have it for 6 months, and therefore we are not going to require authorization." And where does that leave the effect of section 261?

Dr. LIBBY. In this instance, you know, Mr. Allardice, we really are in business in Geneva only this short time. It is quite clear in this case.

Representative COLE. Mr. Allardice is quite right, and irrespective of what you intend to do with the facility, if Federal funds are being used to construct it, no matter where it is located, those funds must be authorized. Does your counsel dispute that?

Dr. LIBBY. Mr. Mitchell, would you answer that?

Mr. MITCHELL. We were advised that this could probably be charged to the operational side, since it was for temporary use and since it was not a permanent project.

Mr. ALLARDICE. May I ask who advised that?

Mr. MITCHELL. This is a question of whether it goes in the operations budget, or in the plant and equipment budget, and we were given to understand——

Mr. ALLARDICE. This is an internal Commission advice?

Mr. MITCHELL. Yes.

Representative COLE. You consider this the same as one of these pilot model reactors, experimental reactors, about which we had discussions last week, and which were carried as operational costs?

Dr. LIBBY. Similar, yes.

Representative COLE. Yet it is not, is it?

Mr. BURROWS. You see, you have three parts of this cost, really. You have the cost of the equipment that you are moving over, and the cost of getting it over there, and the cost of the temporary housing while it is there. The cost of the equipment we will charge against the equipment budget, but that does not require, the way we budget for equipment, specific line item authority for particular equipment, as long as it is in the total amount.

The transportation cost and the temporary structures cost we believe could probably be expensed.

Representative COLE. How do you reason that you do require authorization to assemble the parts and pay the transportation to Manila, and yet you do not require authorization to assemble the parts and to transport them and assemble it in Geneva. Where is the difference?

Mr. BURROWS. One constitutes a permanent project on which we are releasing title, and the other at the moment does not. It gets back to the purpose. One purpose is for a continuing operation, and the other is not.

Mr. ALLARDICE. It does not say that anywhere in 261, Mr. Burrows. You have to get authorization.

Mr. BURROWS. But it is very common practice to consider that any temporary structure is not a facility within the meaning of usual authorizations or the meaning of capitalization which is used in Government or industry. If you go to set up some temporary structures for a particular purpose, they are always expensed by anybody.

Mr. ALLARDICE. Have you an opinion from the GAO as to the allowability for this reactor?

Mr. BURROWS. We do not.

Representative COLE. Why is it not the safe thing to do to put it in, put the request in now before the Congress so there will not be any doubt about it. I think we are straining at technicalities, and it does not go to the substance of it.

Representative HOLIFIELD. Can we go back to the original authorization sheet. I believe we were on item No. 8, the Engineering Test Reactor. That is on the last page.

At this time we will place in the record a letter from the Atomic Energy Commission under date of April 21, to Senator Anderson, signed by Dr. Libby, in regard to the invitation for private capital to be invested in this.

(The letter referred to follows:)

ATOMIC ENERGY COMMISSION,
Washington 25, D. C., April 21, 1955.

Hon. CLINTON P. ANDERSON,
Chairman, Joint Committee on Atomic Energy,
Congress of the United States.

DEAR SENATOR ANDERSON: The Commission has approved a program of inviting industry to build and operate with private funds a test reactor with certain characteristics required by the AEC for the performance of engineering tests on cores, fuel assemblies, and other components of reactors.

Irradiation facilities now available to the AEC can accommodate only relatively small samples and are not suitable for engineering experiments requiring relatively large spaces and very high neutron intensities. The largest suitable irradiation space now available is 1 hole about 5 inches square at the Materials Testing Reactor in Idaho. A reactor of the type planned is required in AEC programs relating to reactor projects for the Air Force, Navy, Army, and for civilian nuclear power development.

The invitation to industry requests submission by July 1, 1955, of proposals to finance, construct and operate a reactor which will provide uniform average thermal neutron fluxes of 4×10^{14} and uniform average above-thermal flux greater than 10^{15} as measured in the midplane of the reactor core over a length of 24 to 36 inches with test space as follows:

(*a*) One 9- by 9-inch, one 6- by 9-inch and three 6- by 6-inch spaces, extending through the reactor and completely surrounded by fuel (with one of the 6- by 6-inch spaces capable of expansion to a 6- by 9-inch space).

(*b*) Two 3- by 3-inch spaces in the core, surrounded by fuel on all 4 sides and extending through the reactor.

(*c*) Four 3- by 3-inch spaces in the core or reflector portion of the core, not necessarily surrounded by fuel on all 4 sides, and not necessarily extending completely through the reactor.

(*d*) Fleixibility in the core design to make possible the insertion of specimens as large as 15 inches in diameter.

The invitation to industry indicates that AEC will contract with the owner and operator of the reactor for a substantial amount of the irradiation capacity of the reactor. It states further that AEC will (1) consider furnishing the required special nuclear material free of use charge for the first 5 years of operation, and at Commission-approved charges thereafter; (2) consider leasing space for the ETR at NRTS, at a location not adjacent to the MTR; (3) process spent fuel elements at charges established by the Commission; and (4) enter into access agreements covering the furnishing of ETR design drawings and specifications, as available to organizations interested in submitting proposals and desiring such information.

The criteria by which the AEC will evaluate proposals are:

(*a*) Extent to which proposal meets AEC irradiation requirements.

(*b*) The schedule of irradiation charges.

(*c*) Minimum contractual obligations by the AEC consistent with meeting Commission requirements.

(*d*) Satisfactory assurance of the date on which irradiation will be provided, which include such considerations as competence and responsibility of the proposing organization, and the adequacy of financing arrangements.

(*e*) Ability to qualify for appropriate licenses under the Atomic Energy Act of 1954.

If none of the proposals received meets the Government requirements, the AEC plans, subject to the approval of the Congress, to build and operate an engineering test reactor as part of the Materials Testing Reactor (MTR) complex at the National Reactor Testing Station in Idaho.

The AEC estimates that to build the Engineering Test Reactor at the NRTS where existing services would be utilized, the capital cost of the reactor, exclusive of fuel costs, would be between $10 million and $15 million. Construction of a reactor, whether private or public, should start no later than October 1955, and be completed within 15 months, so that operation at design characteristics may begin not later than March 1957.

A fact sheet on proposed Engineering Test Reactor is available to interested inquirers.

Sincerely yours,

W. F. LIBBY, *Acting Chairman.*

Representative HOLIFIELD. You may proceed, Dr. Libby.

Dr. LIBBY. If you will permit, Mr. Chairman, I will ask Mr. Fields to continue with the presentation.

Mr. FIELDS. The item for the Engineering Test Reactor, upon which we are requesting authorization in the amount of $14,350,000, is for the construction of a test reactor of about 125 megawatt capacity, power capacity, for the testing of components required in the reactor program generally.

We have immediately ahead a very large schedule of requirements for tests of components, particularly the aircraft nuclear propulsion program.

We have gone to industry with proposals for the construction of such a reactor, and dependent upon the success in those proposals we might go to industry for the construction of this, or we might construct it ourselves.

Critical in this requirement is the urgency of such a facility. We need it in a certain time period, and we are not sure that the proposals that will come in will meet the time factors involved. If we were to do it, we would build it at Arco, and it would be tied in actually with the MTR there for some of the common uses such as water supply and electrical substations and steam plants, and so on.

Our intent, however, is not to proceed with this if an adequate proposal is received from industry for the construction of such a facility.

We understand that there are certain industries that are interested in building such a facility.

Representative DURHAM. What does this do that the Materials Testing Reactor will not do?

Mr. FIELDS. It is of much higher power and higher flux, Mr. Durham, as I understand it, and it will have much larger holes for exposure of components and for inloop tests in the reactor itself.

Representative HOLIFIELD. And more of them?

Mr. FIELDS. And I presume more of them.

Mr. DAVIS. That is correct.

Mr. FIELDS. Yes.

Dr. LIBBY. I think there is another point, that the MTR is so busy that we need another one, anyway, and it is very hard to get experiments in the MTR now.

Mr. FIELDS. Our projections on the aircraft nuclear propulsion program alone are that it will use something like 75 or 80 percent of the time of this reactor over the first 2 or 3 years of its life, in just that program itself.

Representative DURHAM. How long will it take to construct it?

Mr. FIELDS. I believe it is 2 years, approximately. This would be a requirement in order to meet the time schedules that have now been set in the aircraft nuclear propulsion program.

Representative DURHAM. I think that this is the first time we have been told that we needed another reactor for the testing of materials for the nuclear-powered propulsion project. You could not do the job on what we had?

Mr. FIELDS. It is my impression we could not do our job without this, sir. Perhaps Dr. Davis could speak to it.

Representative DURHAM. You said that you could not do your job.

Mr. FIELDS. Not in the time scales that we would hope to meet.

Dr. LIBBY. We have a very tight bind on engineering test reactor facilities. That is a general term. It means reactors in which you test materials for radiation damage and other behavior characteristics. We are going to have to build more of these, if industry doesn't. Someone is going to have to build these in order to go on with atomic power. We hope industry will take this and build it. We cannot afford to run a risk of not having it, however, in case they do not go ahead.

Representative DURHAM. In other words, if you do not get industry to come in and take this job, you are going to do it?

Mr. FIELDS. That is our decision now.

Dr. LIBBY. Yes; and we think we can get industry to do it; but if not, then we would need this. If industry does the job, we will not need this.

Representative DURHAM. Are you going to try another 12 months, or are you going to try 2 months, or what?

Mr. FIELDS. We have called for submission of proposals.

Representative COLE. Do you anticipate one industry would be interested in doing this project by itself?

Mr. FIELDS. It may be, sir, that one industry may be interested in this.

Dr. LIBBY. It is a pretty good business. I could imagine it being a pretty good business.

Representative COLE. What type of industry would this appeal to?

Mr. FIELDS. May I go completely off the record, sir?

Representative COLE. So far as I am concerned.

(Discussion off the record.)

Mr. ALLARDICE. At that point, do you have authority to enter a long-term contract with a private company to take services or use services of this kind? Would this require additional legislation?

Mr. FIELDS. I do not believe so.

Mr. BURROWS. The type of contract we would have would have a termination clause in it, which would mean that if we did not have appropriations or a program to continue, we would be liable for paying

the charges, but we would have to have the funds in hand to obligate the termination charges before we started the contract.

Mr. ALLARDICE. This would be similar to the EEI business before we put 164 in?

Mr. BURROWS. That is correct.

Representative COLE. There isn't any question, is there, but if this project is carried out by the Commission, a charge will be made for the use of that reactor by anybody or any industry which desires to use it?

Dr. LIBBY. No.

Representative COLE. There is no doubt about it?

Mr. FIELDS. Not unless we were to have some arrangement with them, on a question of a joint project basis, under some other provisions of the act.

Mr. BURROWS. That would require a research and development contract.

Mr. FIELDS. Yes; with them to do it, however.

Dr. LIBBY. We have contracts similar to those one might envisage.

Mr. FIELDS. There could conceivably be some kind of joint auspices program where we would have a contract with them. We have nothing in mind that I know of at the moment in this particular one. We will use its time so much ourselves for the first year of its operation.

Mr. HAMILTON. The use of the ETR would presumably parallel the use of the materials testing reactor at Idaho. Would you tell us anything you can about the accounting which is used on that, and as to whether——

Dr. LIBBY. We have a pretty big report on that.

Mr. BURROWS. I think I can answer your question.

Mr. HAMILTON. Is that on a costing system which shows whether or not the testing reactor can be self-supporting financially?

Mr. BURROWS. Yes; it is.

Representative COLE. Which is which, the reporting system is such that it shows that, or the system is such that it is self-supporting?

Mr. BURROWS. Well, the self-supporting would be dependent, of course, upon the demand for the product. A large part of the MTR is used by the Commission itself. If there was the demand, complete outside demand, without Commission use, it could be self-supporting on the basis of the charges that we make; yes, sir.

Mr. HAMILTON. I had a chance Saturday to talk with Mr. Doan, who is the manager for Phillips who runs the MTR, and he says his costing system as it stands now shows that the MTR actually would be making a slight profit if all of the work performed there were done for or paid for by the related projects.

Mr. BURROWS. That depends on how you determine the profit.

Mr. HAMILTON. He was speaking of it in a very loose sense, I am sure, but he also said that if there were acceptance of the kind of charging system for projects that they now are using in the MTR, established for an engineering test reactor, he personally thought it was quite likely that you could get a commercial operator to take on such a plant.

Since 70 percent of the use of the Engineering Test Reactor is generated by the planning of your own contractors in the aircraft nuclear propulsion program, it would seem that there might be some possibility that those firms themselves might be interested in the

project, and they should have enough confidence in their projections for testing for the aircraft program to support that.

(Discussion off the record.)

Dr. LIBBY. We hope to hear from everybody on July 1 or before.

Mr. HAMILTON. How long has this project been under way?

Dr. LIBBY. The letter was signed on April 21, and that was very shortly after the Commission acted.

Mr. HAMILTON. How long has the Commission been considering trying to make up its mind whether or not to attempt to obtain the services of an engineering test reactor, either through Government money or privately?

Dr. LIBBY. I will have to ask for help on that.

Mr. DAVIS. I was not here then, but it is my understanding that this has been considered for a matter of 2 years, and that the proposal was at one time made, and I do not know how far it got.

In this particular connection, we have been considering the matter since roughly last August, when we got Phillips to draw up a conceptual preliminary design of what such a machine might look like, and since then we have been investigating the various ways in which we might be able to get industry to come in and help us out with this job.

I might add that in some of the discussions, the conditions under which they were willing to do this essentially amounted to a complete, 100-percent guaranty by the Commission, so they couldn't possibly lose any money. It has been our opinion that this kind of an arrangement is not really what we are looking for, and so we have been trying to find some formula whereby there would be some real industrial participation.

Representative HOLIFIELD. On that point, I want to say that I do not worship this fetish of getting someone to come in and do it provided you have to tie yourself up with a guaranteed contract at high prices. So I hope that any kind of an arrangement that is made will be with the idea in mind of reasonable charges paid by the Government for its 75 percent of the workload, as well as getting rid of the budgetary item.

Representative DURHAM. If we are going to try to build a nuclear-powered engine for aircraft, which we feel that we are, I see no reason why this item is not fully justified for a long-range program.

Representative HOLIFIELD. For the Government.

Representative DURHAM. Why mess with anybody else. Go ahead and build it.

Representative HOLIFIELD. It seems to me that there should be no delay on it and you should not have to worry about delay; if private industry will not come into it on a very reasonable basis, and very promptly, we should get to the work of building this ourselves, it seems to me.

Dr. LIBBY. We are already working on that.

Mr. TAMMARO. It was our intention when General Nichols was here that this could be done two ways; to be sure, we could build it, but then again you have the other thing, that people have been coming in to see us and saying they would like a crack at it. We could not, under the act, very well say no, and that is the only reason. We are prepared to move.

Representative HOLIFIELD. But do not worship the fetish of getting outside money in, to the point where you do it at the long-term detriment of the Government, or in any way that would preclude us from utilizing it to the fullest extent on this nuclear aircraft program.

Mr. HAMILTON. Mr. Hinshaw was unable to be here this morning on this item, but asked if the Commission knew of any way we could make it clear in the authorization that if this Engineering Test Reactor is authorized, it is being authorized primarily to expedite the aircraft nuclear propulsion program, and that under no circumstances are any aircraft nuclear propulsion programs which are clearly needed for the forwarding of that project to be set aside to allow other projects, for instance, assuming a subsequent merchant ship development later on, or something else; that this is intended to be, not language that any ANP project must have priority, but something which you think you could live with which would give us a chance or give the committee a chance to indicate it is the ANP need which brings what support there is for this project.

(The information referred to appears in appendix D, p. 178.)

Dr. LIBBY. I think we would have to take that under advisement. We look at the relative priority of these projects very much the same way the committee does.

Representative HOLIFIELD. We would like to strengthen your hand on that.

Mr. FIELDS. That could be handled in the report itself.

Mr. HAMILTON. Would there be a suggestion of language which would not be excessively binding or not make it awkward in terms of legislative history, which at the same time would make the point and make it really stick?

Mr. FIELDS. I do not have a suggestion at the moment but it would seem to me the best way would be the report, and we can work on it and with your staff later on, if it is all right with you, Mr. Chairman.

Representative HOLIFIELD. That will be all right. I think you know how the committee feels about this.

Let us get on to the next item, the special reactor.

Mr. FIELDS. I wonder if I could interrupt for just a moment, Mr. Chairman.

Last Monday we had some discussions of the Large Ship Reactor.

Representative HOLIFIELD. We thought we would go right down the list and come back to that.

(Discussion off the record.)

Representative COLE. Can we not go down through these items?

Representative HOLIFIELD. There is a rollcall in the House on the Post Office conference report, and I think we had better return here at 2 o'clock, because we have to go through this and get back to the big ship reactor.

Representative COLE. I was trying to eliminate some of these smaller items.

Representative HOLIFIELD. Let us adjourn now and come back at 2 o'clock.

(Whereupon, at 12:30 p. m., the committee recessed until 2 p. m., of the same day.)

AFTERNOON SESSION

Representative HOLIFIELD. We will proceed.

Mr. FIELDS. The next is for a reactor training school at the Argonne National Laboratory, a request for authorization in the amount of $712,000 for the construction of a building of approximately 37,000 square feet, at which there would be a school for foreign and domestic students. We urgently need this project, in the hope that it will be in being by March 31, 1956, as a part of the general training program of the Commission in this field.

Representative DURHAM. My predictions have come true, that we would be in the school business before we got out of this.

Dr. LIBBY. I hope we are not going to stay in it forever.

Representative DURHAM. That is wishful thinking. I have been here nearly 20 years, and we never get out of anything; we just get into things.

Can we not avoid this somehow; with all of the colleges we have in this country, somebody ought to have brains enough to keep this matter of instruction, which can be very pertinent to the whole educational system, out of the Government.

Dr. LIBBY. As we get more reactors——

Representative DURHAM. This is just the easy way out, I know that.

Dr. LIBBY. We have one school now with a reactor, North Carolina, and we have several others coming.

Representative DURHAM. I had to fight like everything to get that one in, and of course I know what the situation is. You have more applications than we can possibly take care of down there. It is 3 or 4 to 1. But the trouble is in getting teachers.

Dr. LIBBY. That is one big trouble.

Representative DURHAM. That is what we face down there. And now we are getting into the school business here.

Dr. LIBBY. I anticipate that the Argonne School, or I hope this will develop and we are trying to bring this about—that some of the places in the Argonne School can be used for teachers who are going to then teach courses in the regular engineering schools.

Representative DURHAM. This is $712,000, and next year I am afraid it will be $1 million or $2 million, and then we are in the field of higher education. We will be in the graduate level, and then the postgraduate level and everything.

I just feel we are getting into something that has far-reaching implications in the field of education.

Dr. LIBBY. We have to take care of our manpower shortage, which is really our most critical problem in the whole atomic power problem. We can do it in this way, taking graduate engineers and giving them a short 1-year course in this business, and they can switch fields. This course is good enough, I think, for that purpose. We can take graduate engineers and move them over.

Representative DURHAM. Could you not contract with some college to do this work?

Dr. LIBBY. We are trying to get—it seems almost necessary for them to have a reactor to play with, and we have only one school and, as you know, they are doing quite a lot. They are planning on doing more, and we are going around all over the country talking to all of the schools and trying to get them interested in this adult education

program. Now, of course, they are interested in the long-range program, in their regular engineering programs, undergraduate programs, but right at the moment there is only one school with a reactor This need is very immediate.

Representative DURHAM. When will the others come into being?

Dr. LIBBY. I think Michigan is the next one—I am sorry. Penn State is the next one.

Representative DURHAM. Is there not some college close to the reactor with whom we can contract, and not put up laboratories where we already have laboratories? These students can travel 10 or 20 or 30 miles.

Dr. LIBBY. It takes an engineering faculty, as you very well know, Mr. Durham, learned in that field. There is not at the moment any engineering school with such faculty, not at the moment.

It is our hope that within 2 or 3 years this will not be true in places like Columbia, MIT, and North Carolina, and various places, and Penn State, where they can take the load. What I think will happen is that the load will be so big that you will still run the Argonne School, I am afraid.

Representative DURHAM. I am afraid so, too. That is what worries me.

Dr. LIBBY. But in a way, this is a kind of trouble that you want.

Representative DURHAM. How many engineering schools have we in this country?

Dr. LIBBY. There must be thousands of them; hundreds of them, anyway.

Representative DURHAM. It would seem that some of them would be qualified to take on this job, and not have the Government get into this business at that level. We will always have an excuse to stay with it as long as we have applications for more than we can take care of in the colleges. It is somewhat like the schools of medicine. They are facing the same situation.

Last week, we turned down scholarships for the medical schools, and of course primarily because it would not increase the number of doctors because there are applications now for every place. We are not going to increase them that way.

When you get into this, you are going into the use of the laboratories, and someone else will want to set up a laboratory to teach doctors, and so on, all along the line.

Dr. LIBBY. It is certainly our feeling that we should minimize our educational activities. However, the overriding responsibility is to see that we get on with atomic power, and at the moment we cannot contract with any single engineering school for this type of quick course, to change people from electrical, mechanical, and chemical, and train them in nuclear techniques.

Representative DURHAM. What are you going to require, at least a graduate level?

Dr. LIBBY. There are two kinds of requirements. There is the regular 4-year undergraduate engineering course, and then the engineering schools are taking this challenge, and before long you will find people being trained as soon as they can get their reactors and make their arrangements so that people can get the practical experiments and the lab courses.

The other requirement is a short-range, 1-year course for graduate engineers, the kind of thing we are doing at the Argonne right now.

Representative HOLIFIELD. Is that in the operation of reactors? Is it in the whole field of reactor technology?

Dr. LIBBY. It is the principles of construction, operation, design, and irradiation, and everything they can teach that is important and which is unclassified. Incidentally, this is an unclassified school.

Representative DURHAM. You are going to use the faculty in Chicago University?

Dr. LIBBY. To a minor degree. You see, the University of Chicago has no engineering school.

Representative HOLIFIELD. Are you importing a faculty there, or using men who are there?

Dr. LIBBY. I will have to ask one of the men who knows about that. Will you answer that question, Dr. Davis?

Mr. DAVIS. We have gotten an associate dean from the Coast Guard, Captain Hoag, but the remainder of the faculty are all people who are taking this on as a part of their duties at the Argonne National Laboratory.

Representative HOLIFIELD. They will be stationed there for other purposes, and you will utilize their knowledge and background as teachers in certain classes?

Mr. DAVIS. They are people who are there, by and large, and they are people who have had previous experience as professors and as teachers.

Representative HOLIFIELD. So your answer to this is really three: One is the urgency of it, and the second one is that you have got the reactor there to use, and third, you have also a great bulk of your faculty there on regular jobs who can be put on a part-time instruction basis. Is that your position?

Mr. DAVIS. The facilities, including reactors but not exclusively reactors, which are not available at any school, and there will be a great period of time before these many different kinds of facilities would be available.

Representative HOLIFIELD. Give us an idea of what some of them are.

Mr. DAVIS. You have several kinds of reactors there, and you have these zero power reactors and assemblies which are actually better in some respects, as far as teaching is concerned, and you have a lot of chemical laboratories and physics laboratories and specialized equipment, and they are simply not available today in many of the universities. In addition, you have a faculty there which you could not duplicate today in any university. You have the world's experts on reactor technology here, and on physics and chemistry, and although universities may have 1 or 2 or 3 such people, there is no single universiy which would be able to begin to compare with them.

Representative HOLIFIELD. And they are on a rotating basis. They come there and serve a while, and then go, and others take their place?

Mr. DAVIS. These are permanent members of the Laboratory staff, at least so far. They would probably rotate the assignments insofar as their assignments at the Laboratory are concerned, but they would be people who would stay at the Laboratory permanently as employees.

Dr. Hilberry, who is the dean of the school, is also the Associate Director of the Laboratory.

Representative DURHAM. How many reactors are being built today on college campuses?

Dr. LIBBY. North Carolina and Penn State. There are three under construction, and Michigan is the third one.

Representative DURHAM. Of course, a lot of this, if we would release the material, could be taught in any college. If it is not taught, it is our fault.

Mr. TAMMARO. Initially the intention was to have this unclassified, but should we get some classified bilateral agreements, then this will be the only place where we can have a course.

Representative DURHAM. You have no business making a bilateral agreement if you cannot release the material. That is my own personal opinion.

Representative HOLIFIELD. Mr. Hamilton has a question.

Mr. HAMILTON. I wonder why you testified that the school was not within the basic concept of the National Laboratory?

Dr. LIBBY. Did I so testify?

Mr. HAMILTON. That seemed to be the implication, the hope that you could get out of the educational business in the laboratories.

Dr. LIBBY. It is my feeling that this is a business of the schools and universities and engineering schools.

Mr. HAMILTON. Isn't this why there are syndicates of universities actually operating in the national laboratories?

Dr. LIBBY. It is true that one of the functions of the national laboratories is to promote just this kind of thing, but I would hope in each instance that the universities would take over their proper function, which is teaching, and relieve the laboratories of that.

Mr. HAMILTON. But Argonne is in fact operated by the University of Chicago, in collaboration with a group of universities, and Brookhaven the same, and Oak Ridge National Laboratories.

Dr. LIBBY. The contract is a bit different in form, but fundamentally, with all three of these laboratories, we have universities associated with them.

Representative DURHAM. What you have now—do you have any backlog of applicants?

Dr. LIBBY. I would have to ask someone to give that answer.

Mr. DAVIS. In this school we have something like 120 applicants already, although we have not announced the second round of the course, and these are foreign applications.

Representative DURHAM. Foreign applications entirely, is that right?

Mr. DAVIS. The State Department has not formally circularized the other nations for applications, but I believe it is somewhere around 110 to 120 that have been received.

Mr. HAMILTON. If I remember the history of the idea of the national laboratories correctly, one of the reasons for establishing them was to provide universities, including engineering schools, with the experimental facilities which they could probably never bring together on any single campus.

Dr. LIBBY. Exactly.

Mr. HAMILTON. Therefore, someplace like Argonne or Brookhaven essentially is a center of such equipment, and students from the particular schools could come there.

Dr. LIBBY. That is right.

Representative HOLIFIELD. Is it not true they would have access to a more varied type of reactor and processes there than they would have at either MIT or other colleges and universities?

Dr. LIBBY. I hope in a year or so we can get a number of engineering schools with reactors to take the great bulk of the load, and Argonne is not going to be able to carry the load, even if we do all this. It just can't.

Representative DURHAM. How many students do you have there at the State college in North Carolina now?

Dr. LIBBY. I was talking to Dr. Beck the other day, and he is giving a summer course this summer, a 1-month course.

Representative DURHAM. Does he have a backlog of applications now?

Dr. LIBBY. I believe so, but I do not have the numbers in mind.

Representative DURHAM. Those men are qualified well enough to run reactors?

Dr. LIBBY. I hope they will help carry this load. Other engineering schools at other places, also. I think everybody is going to have to work on it, because I think the number of students is going to be large.

Representative DURHAM. There is one thing. Probably it is the colleges' fault, because they have had the opportunity, and I know there are plenty of them rich enough, but they will not go to work. And now they are going to wake up and find students going to a Government school, at Government expense.

Representative HOLIFIELD. Mr. Hamilton, are you through?

Mr. HAMILTON. I was wondering whether, since universities run the laboratories, the students could not actually be channeled into the laboratories through the universities in some contract method, rather than making it a Government operation.

Dr. LIBBY. Last fall when this thing was arranged, it was completely clear, you see, the new thing about this course. This course is unique, and it is the best course in the world given on reactors, in my opinion. There is the experimental experience the students get. It is true they can get the theory out of reading our unclassified library, and MIT has been teaching a course for years, and various other engineering schools, on the theory side of reactors. But this is not enough. You have got to work with this experimentally. They do most of their learning, at least in my opinion, in the experimental laboratory courses.

Mr. HAMILTON. My question goes to Mr. Durham's inquiry, really. Could not the problem of having this appear to be a Government-operated school, solely Government financed, be at least alleviated by having these students actually sent by the universities; have the Government give a scholarship, or whoever puts up the money, and have them pay it to the university or the association of universities who run a particular laboratory, and then have the university in turn assign the man to do his actual experimental and class work at the national laboratory in connection with their basic contract with that laboratory. That would avoid the implication that the Government is setting up a competitive educational system, that is, if it were more closely integrated with the contractual relationship between the laboratory and the universities.

Dr. LIBBY. Most of the students now, of course, Mr. Hamilton, are foreigners. Out of the 50, I think 32 of them are foreigners for

this class. It was a rush job and set up on short notice. They did a magnificent job of getting that course together in a hurry there. I saw the syllabus, the book, and it is a book this thick [indicating 2 inches], of lectures. I visited out there, and I saw the laboratories and the facilities, and it is a wonderful place.

Representative DURHAM. There is a big advantage to a foreign student going there rather than to an engineering school down in my State, because of the cost. There is pretty keen competition to subsidize a Government school and then, of course, expect it to go on. I think we are going to get hit with this thing.

Representative COLE. I still do not understand what is proposed to be done. It has been said by the Chairman of the Commission that they hope sometime to have a 1-year course for graduate engineers. What are you going to do until then?

Dr. LIBBY. We have one now, sir.

Representative COLE. What is that?

Dr. LIBBY. It is not a year. It is several months. We have one at Argonne, and what I would like to see the engineering schools do is copy the Argonne, essentially.

Representative HOLIFIELD. You hope these other colleges will have this?

Dr. LIBBY. Yes, sir, copy it, or maybe not copy it but have something similar.

Also, Mr. Cole, incorporate into their regular——

Representative COLE. How long is your course now? I am trying to find out what is being done.

Dr. LIBBY. They start in March and they end in September.

Mr. DAVIS. The first course is 7 months, because it got started rather late. The intention is in the next one, which would start in November or late October, to make this probably of the order of 9 months, and eventually get it on to essentially a year course, and perhaps 10 or 11 months each year, starting coincident with the regular academic schedule.

Representative COLE. How many students can you handle?

Mr. DAVIS. We have 40 there now, of whom 31 are from 19 countries, and 9 from this country. I would say that this is—well, actually Argonne had felt they did not want to take more than about 30, and 40 is crowding the present facilities very, very much.

Representative COLE. This $712,000 will enlarge your capacity, student capacity, to some extent?

Mr. DAVIS. This is designed to allow us to take care of 120 students.

Representative COLE. A total of 120?

Mr. DAVIS. Yes, sir.

Representative COLE. How will those students be selected?

Mr. DAVIS. They would be selected by the various countries who would be invited to send students, and would be screened by an admissions committee who would make sure that they had the necessary academic qualifications.

Representative COLE. Does the Commission determine what portion of the 120 will be foreign and what portion will be native?

Mr. DAVIS. I do not think so. Probably it will be about two-thirds or three-quarters foreign.

Representative COLE. I should think that the Commission would have determined to what extent this school would be used for training

of foreign students and what portion of the students would be Americans.

Mr. DAVIS. The intention is to have, or it was designed primarily for the foreigners to use, but it was intended to have a fair representation of American students, both to help out the American students and to provide some intermingling of Americans with the foreign students, so that they would have the feeling that they were getting the same training, and it would help to pass on some of our ideas to them.

Representative COLE. I have no doubt but that you have dozens of applications for every one vacancy at this school. How do you select the American applicant who will be accepted in the school?

Mr. DAVIS. We did not have a large number of American applications.

Representative COLE. How long has the school been in existence?

Mr. DAVIS. Since March.

Representative COLE. So it is understandable that you would not have many applications. But a year from March when this gets underway, you are going to have a great clamor for it, and I would like to know what the system of selection of students would be.

Mr. DAVIS. We would have a board, composed, as I would expect, of the people at Argonne, and some representation from the AEC and whoever is handling the foreign operations end of this thing, to establish the academic qualifications and such other qualifications as they might feel would be desirable, and pass on the applicants.

Representative COLE. You would expect that would be the system?

Mr. DAVIS. This is what we did in connection with the first course, and I am sure it is what we will do in connection with the other.

Representative COLE. Do the students pay any part of the tuition?

Mr. DAVIS. The foreign students and the American students are paying $500, I believe, for this shorter course.

Representative COLE. Is that for tuition, or for their maintenance?

Mr. DAVIS. That is for their tuition, and I believe the FOA is actually paying that for most of the foreign students.

Representative COLE. And the FOA is also paying the maintenance of the students?

Mr. BURROWS. They have to pay their own, Mr. Cole.

Representative COLE. And the foreign students have to pay their own board and keep?

Mr. BURROWS. Yes, sir.

Representative COLE. And the FOA pays the tuition of foreign students?

Mr. BURROWS. They pay their own tuition, their countries do.

Mr. MCCARTHY. I think FOA may be paying some.

Representative COLE. I hope there will be somebody who will give you the whole story when they come to the Appropriations Committee.

Dr. LIBBY. Would you want a copy of the application forms? And I do not know whether you want this thick book on the course.

Representative DURHAM. Most of these students, as I recall, Doctor, in talking to them, all had either a master's degree or doctor's degree in order to be accepted up there this time.

Dr. LIBBY. They are all good quality students.

Representative DURHAM. Are you going to apply that to each applicant, or are you going to let a 2-year engineering student take the course?

Dr. LIBBY. I should think—and we have made no firm determination on this—that they would have to be good graduate engineers in order to profit, just judging from the content of the course; they should be graduate engineers or equivalent training.

Representative HOLIFIELD. Mr. Allardice?

Mr. ALLARDICE. Did you say, Dr. Libby, that this is the only adequate course in the United States?

Dr. LIBBY. Yes, sir.

Mr. ALLARDICE. When this school is added, if it is authorized, it would make it possible to take 120 students, of which about two-thirds would be foreign?

Dr. LIBBY. Well, we have not firmly determined that latter matter.

Mr. ALLARDICE. It is certain that a sizable proportion would be foreign.

Dr. LIBBY. I would hope so.

Mr. ALLARDICE. Do you think there will be a large demand on the part of American industries to place their people in such a school?

Dr. LIBBY. I hope so, and I expect it.

Mr. ALLARDICE. How would you select which industries or which people from which industries, would be eligible?

Dr. LIBBY. It is a tough problem. I think our only hope in this, in the long pull, is to get the universities and the engineering schools in to help, because I do not think the Argonne alone can do it, and I do not think it will be able to do it.

Representative DURHAM. Suppose a company like GE comes in and says they have 5 men and they want to send them out to take that course for 7 months, and suppose another company comes in with a like request. Then we have a number of applicants, and you are going to have to have some kind of a division here as to how many you are going to take from outside and how many from inside. We are going to have trouble.

Representative HOLIFIELD. I think the committee can assume that as they get into this operation, they will develop an admissions board commensurate with the task imposed upon them.

Speaking personally, it seems to me that you are justified in going about this as a pilot operation. You are setting up a new type of course, and rounding it out with an experienced faculty which you have in one place there, and the facilities that you have in one place. It seems to me that this is an item which should not be quarreled with very much, speaking personally, at least until you get it going. I do not think it should be developed into a great university, but certainly in setting up these pilot courses and in rounding out your course, it would seem to me that this could serve a good purpose. Then, as you say, if the colleges and universities will copy this and will set up similar courses, it would have achieved its purpose in getting this thing off the ground.

Dr. LIBBY. That is our hope.

Representative DURHAM. We will be so deep in this that we will never get out.

Representative HOLIFIELD. That is a thing that we are going to have to watch, of course, but I do think that a pilot approach to it, such as this, is justified.

Representative COLE. I would like to have the assurance or at least to know what the Commission's policy would be with respect to

the extent, if any, to which the Commission will subsidize the students engaged in this training. If it is to be the fact that all students will be charged a tuition and will be required to maintain themselves at their own expense, then I think the Congress should be apprised of that. But it would seem to me that if a tuition of $500 for a year's instruction in this very highly specialized field is all that is charged, that in itself is a subsidy of major proportions by the Commission.

Dr. LIBBY. It is a subsidy.

Representative COLE. Will it be the policy that these students pay the tuition of $500 a year?

Dr. LIBBY. That is our present policy.

Representative COLE. And maintain themselves, and then the Commission will not support them?

Dr. LIBBY. That is our present policy. I do not think it will be necessary to change it or desirable to change it at all.

Representative HOLIFIELD. Can you submit to the committee a statement on this, setting out in a little bit more formal language your thinking on this, so that when this item does come up we will have not only your reasons for it and the reasons why you selected the Argonne site, and the type of course that you plan to round out, whether it is a unique course or not, but also the limitation that you expect to set upon yourself—that you do not expect this to grow into a great university, and you are offering it at this time to fill a gap which is not otherwise filled. Also the methods of selection, I think, in the future, and I suppose the State Department will have a good deal to say as to what percentage of foreign students will be there in view of the fact that you say this goes to implement the President's stated policy of providing technical information to the other countries in building up their capacity to use reactors. This must be considered a part of the basis of spreading this learning to our friends in foreign countries.

(The information referred to appears in appendix A, p. 173.)

Dr. LIBBY. Yes, sir.

Representative DURHAM. Will you state today to the committee that this is a temporary operation, and that you do not intend to continue this when the colleges of this country can do the teaching which is required?

Dr. LIBBY. Our answer is certainly "Yes" to that. However, it has not been a matter of a formal Commission paper. My own feeling is this: that as soon as the colleges can pick it up, we will let them and encourage them to do it, and it is our idea that school teaching is not our main business. Aiding in research and instituting new courses to help the atomic power program, this may be. But this is, in fact, because of our overriding policy to promote development of atomic power. But school teaching is not the Commission's business when it can be carried by the regular schools.

Representative DURHAM. I can see a further excuse, of course, for getting into this field, where we arrive at a decision that we have got to give some information through these courses which cannot be given out to the colleges, and then we will have another further excuse to extend it.

Is it the intent of the Commission to subject this to security to a point where we will always have an excuse to continue the operation of it?

Dr. LIBBY. No.

Representative DURHAM. I raise that point because of what Mr. Tammaro said a few minutes ago.

Mr. TAMMARO. I merely mentioned that the original intention of the school was to have it unclassified. It may be—and I do not know what is going to happen—that if the Commission does make bilateral agreements, some foreign students I imagine will feel highly insulted taking unclassified courses. What they may want to do is take some classified courses.

If you had that condition, you have but one place to put it, and you cannot put it in the colleges. Eventually this can be done, of course.

Representative DURHAM. Can this committee be assured that this will be kept on an unclassified basis?

Mr. TAMMARO. I cannot speak for the Commission.

Representative DURHAM. Could we have some expression on that?

Dr. LIBBY. Our present course is completely unclassified, and I really do not expect that it is going to change. It may become necessary, but I do not expect this to change.

Representative HOLIFIELD. Let us proceed along with these next three items. I understand they are not very controversial. Will you please explain those to us, and then we are going to go on to the Large Ship Reactor, in view of the time.

Mr. FIELDS. This is a facility for handling radiochemical materials at Argonne Laboratory requested in the amount of $448,000. This is to provide a heavily shielded area of equipment for separation process research work, really, with highly irradiated materials. It is needed in conjunction with the fast breeder pilotplant operation. That is in order to process and study the fuel that will be used in that reactor.

Representative HOLIFIELD. Are there any questions?

Mr. ALLARDICE. Item 41 proposes that for Oak Ridge there is to be built a high-level activity cave, about twice as large, costing about half this amount. What is the reason for the difference in prices?

Mr. FIELDS. This is the same sort of an activity, but tied principally with the homogeneous reactor. The differences in cost there—I think we have those figures. There is a 27-percent differential in cost between the locations, and there is additional equipment in the one at Argonne over the one at Oak Ridge.

Perhaps you could be more specific, Dr. Davis.

Mr. DAVIS. Looking at the differences, there is a difference we feel of about $75,000 in the cost of construction at Argonne versus Oak Ridge. There is about $64,000 difference in the cost of the equipment which will go into the different ones. Then there are some other small differences that amount to about $29,000 at Argonne. We have to remove a concrete wall, whereas we do not have to do that at Oak Ridge.

Mr. ALLARDICE. The one at Oak Ridge is twice as big, as I understand, as the one at Argonne. There is a 27-percent differential in cost of construction, and the difference in total cost is $448,000 as against $280,000.

Mr. DAVIS. I believe in one case they are talking about the actual shielded area; and in the other case they are discussing the total area. That is, the inside of the cave will be 8 feet wide, as I picture it.

Mr. ALLARDICE. What type of materials do you intend to handle at Argonne?

Mr. DAVIS. Plutonium and irradiated fuel elements, and things of that nature.

Mr. ALLARDICE. And the same kind of material at Oak Ridge?

Mr. DAVIS. Yes, sir; these are both facilities for studying the chemical processing of irradiated fuels with high buildups of plutonium for isolating plutonium and trying to recycle it back into the reactor.

Mr. ALLARDICE. Could the same work which is being done in the Argonne facility be done in the Oak Ridge facility, assuming there is no conflict in time?

Mr. DAVIS. I am not prepared to answer that fully, but it is the same general nature of work. In one case they are studying one type of chemical processing and refabrication, and in the other case they are studying different ones. The details of equipment that go into the cells will be quite different. Of course, you could not make this kind of a swap without changing equipment in the cells also.

Mr. ALLARDICE. This is not a competition of design. It is designed for a specifically different purpose.

Mr. DAVIS. These cells are almost always designed for a specific purpose, and the equipment that goes into them is adapted to carrying out those particular experiments. They are quite different.

Mr. HAMILTON. Isn't the process and the fuel they are working with at Oak Ridge fluid fuel, and the one at Argonne the heterogeneous program?

Mr. DAVIS. They are both working with the heterogeneous and the aqueous.

Mr. HAMILTON. And they are in fact working with fuels that are essentially entirely matters of chemistry, radiation chemistry, as well as straight processing chemistry; while the people at Argonne are working on heterogeneous problems for the most part.

Mr. DAVIS. Their problems are all heterogeneous.

Mr. HAMILTON. Is it fair to say that the kind of cost difference we have between these two hot caves is an expression of the inherent difference in cost factors between homogeneous and heterogeneous systems?

Mr. DAVIS. Not at all. These are entirely experimental.

Representative HOLIFIELD. Let us take item 40 now.

Is Oak Ridge aware of the Argonne plans, and is Argonne aware of the Oak Ridge plans, of these caves?

Mr. DAVIS. To the best of my knowledge, they are quite aware of each other's plans.

Representative HOLIFIELD. Item 40 is the engineering building at Argonne, requested in the amount of $295,000. This is to provide a reactor engineering building for Argonne to house the reactor physics section and a part of the reactor research and engineering division at that location. We have an approximate floor area of 14,500 square feet, and it is really needed to consolidate their reactor work there. The division personnel at Argonne is involved there.

Representative DURHAM. The school didn't create that item, did it?

Mr. FIELDS. No, sir.

Representative HOLIFIELD. Let us go back now, if there are no questions on that. Let us go back to the Large Ship Reactor. We touched on item 41.

We will go back to the Large Ship Reactor now.

(Discussion off the record.)

(The following is an unclassified version of the off the record discussion of this project:)

The Large Ship Reactor project provides for the construction of a land prototype of a nuclear powerplant suitable for propelling a large naval vessel. The present cost estimate is $25,000,000, of which $6,000,000 is required for obligation in 1956, and the remainder in subsequent years. The prototype is to be constructed at the National Reactor Testing Station in Idaho, and the reactor system will be of the pressurized water type. Research and development work on the reactor was assigned last fall to Westinghouse Electric Corp.

A major military advantage of nuclear power for naval vessels is in the field of logistics. The cruising range and strategic value of any warship has heretofore been limited by the amount of fuel it could store in its hull. When its fuel supply is depleted, a conventional ship must turn to a fueling ship or a fueling station for replenishment. Refueling operations are both time consuming and hazardous. They reduce the capability of a task force to defend itself.

During World War II the Navy succeeded in operating a mobile refueling base, one which could follow the task force. The striking power of the task force was thus extended, but only by providing an endless chain of tankers to replenish the mobile base.

Nuclear powered surface ships will have virtually unlimited cruising range, even at high speeds. No refueling ships and stations are required to replenish their propulsion fuel. The refueling of nuclear powered vessels would be done routinely as a part of regularly scheduled overhaul. As a result, the repair and overhaul facilities required to service the eliminated tankers could be reassigned. Fewer escorting vessels would be needed to protect the reduced number of tankers. Personnel now assigned to man such fleet support ships and related shore facilities could be used for other purposes.

Use of nuclear power in an aircraft carrier offers additional specific advantages. Space now used to carry fuel oil can be used for larger quantities of aviation fuel, ammunition, and other supplies. The carrier is thus able to support many more hours of aircraft flight, and its military capabilities are correspondingly increased.

Another advantage from using nuclear power in a surface ship is the elimination of the requirement for large quantities of air for fuel combustion. In a conventional ship, supply ducts lead the necessary air to the boiler spaces. Other ducts and stacks remove the gases resulting from combustion. Altogether, these ducts take up a great deal of volume on the upper deck levels, space which can be used for other purposes in a nuclear powered ship. The rupture of exhaust ducting during battle can spread fumes throughout the working area below decks. In an aircraft carrier, stack gases are a fume hazard to personnel handling and operating aircraft on the flight deck. With nuclear power, these hazards are eliminated, and better arrangement of the upper decks for aircraft operations is made possible.

The ultimate objective is the development of nuclear power for naval vessels is a nuclear powered task force, capable of remaining indefinitely at sea without refueling. The type reactor chosen can have application for different types of large surface vessels.

The development of a reactor for a large ship can best be accomplished by constructing and operating a land prototype. Experience gained from operation of the land prototype of the Submarine Thermal Reactor for more than 18 months prior to completion of the submarine *Nautilus*, has shown that this course offers the following important advantages:

(*a*) Design deficiencies, which can be expected in the development of any new powerplant, will be uncovered in the prototype plant and corrected prior to use in the shipboard plant.

(*b*) Prototype operation will lead to simplifications and detailed improvements of shipboard systems prior to installation.

(*c*) Prototype operation will lead to simplification of operating procedures and will provide training of the prospective ship's crew in the operation and maintenance of the powerplant.

(*d*) Construction and operation of a land prototype will result in a material reduction in the time required to build and test the ship and its powerplant.

A land prototype will allow plant testing to be divorced from actual ship operation. Compared to the powerplant in an operating ship, the land powerplant will provide facilities that are more readily adaptable to the collection of a great deal

of engineering and physics test data. In the case of a large surface ship there will be multiple reactor installation which will represent major advances in reactor technology. The advantages to be gained from prototype operation are therefore correspondingly increased.

There are specific differences in the large ship reactor prototype and a central station nuclear powerplant. These include weight and size considerations, ability to withstand shock, and provision of ready accessibility for repair and maintenance. More flexibility in rapid changes in power level will be required from a plant used to propel a ship than is required for a plant designed to produce commercial power. Hence, the control system required for a nuclear powered surface ship will be much more complex.

Representative COLE. Could you tell us whether a reactor suitable for a surface naval craft would be usable in a merchant vessel.

Admiral RICKOVER. Yes, sir, it would.

Representative COLE. Without any special alteration?

Admiral RICKOVER. There would be some alterations in piping, and so forth, and you would have an opportunity to get somewhat more accessibility, but as far as the nuclear part is concerned, I would say that you could change it over from a naval vessel to a surface ship.

For instance, the passenger liner *United States* has machinery which is about equivalent to what you get on a large naval vessel, and there is not too much difference.

Representative COLE. So when we consider this, we should have in mind that this project for a prototype surface vessel reactor will give valuable lessons for merchant ship use.

Admiral RICKOVER. Any type of reactor does, but one that is designed for a naval surface vessel gives you far more lessons than one that is designed for a submarine.

Representative COLE. I asked you on the side, and I wish you would answer it for the record, for an explanation of your statement this morning when you said that in your opinion, it would be 7 or 8 years before atomic reactors could be built for surface-ship propulsion which would even remotely approach competition or competitive practicability with conventional ships.

Admiral RICKOVER. I will take the specific case of the reactor which is proposed for this merchant ship. That is a submarine reactor, and with the shielding that you have to put in because the reactor is not designed for this purpose, the chances are you will not gain anything in cargo vessel capacity. Perhaps you will gain a little. I do not think that you will.

Representative COLE. Let me make sure I understand you there. You say that you will not gain anything in cargo capacity, even though you will not be required to have space for fuel oil?

Admiral RICKOVER. I do not think you will, because in this first ship you are building, sir, you are building it for a very special purpose, and where your primary object is to demonstrate nuclear power rather than cargo-carrying capacity. If you were to build a nuclear reactor specifically designed for a merchant ship, it would probably take you over 5 years, if you started in today. The chances are it would be more than 5 years before you would have it, if you designed it specifically for a merchant ship.

(Discussion off the record.)

Representative COLE. There is only one more thing, Admiral, that I would like to get in my mind. Will this be a steam propelled adaptation of nuclear power?

Admiral RICKOVER. Yes.

(Discussion off the record.)

Representative COLE. While you are on the stand—and it may be that I divert only hoping that perhaps Admiral Rickover can answer—can you give a guess of what it would cost, the added cost to this world ship, to give it a capacity to generate electricity?

Admiral RICKOVER. Let me——

Representative COLE. Something on the order of five to ten thousand kilowatts.

Admiral RICKOVER. Let me explain how you do that, first, if I may, before I answer this other question.

During the war I was responsible for converting eight escort vessels, and they were electric-drive ships. First you are going to have an electric-drive ship for this, and unless you put in a large auxiliary plant, which would be very expensive, you have electric drive. If you make the ship electric drive, then you can fix it up with equipment where you can vary your frequency and vary your voltage to take care of any port you wish to visit, so that that is going to add to the expense of the ship, and it is also going to take more time because it is a development job. We had eight escort vessels fixed up this way, and the difficulty was to supply power to the oilfields which had been wrecked in the Pacific by the Japs, and we figured we would have a big logistic problem. Actually the ships did supply power to Guam and to Manila and to Naples. They were three of the places. So I would say for four or five million dollars you could do this.

Representative COLE. And how many more months?

Admiral RICKOVER. Now you are asking me for somewhat of a guess.

Representative COLE. Your guess is as good as anybody's in this room, even if it is 1,000 percent off.

Admiral RICKOVER. It won't be 1,000 percent off.

Representative COLE. No matter what it is.

Admiral RICKOVER. I think if you made a crash program out of this——

Representative COLE. We cannot make a crash program out of it.

Admiral RICKOVER. You can with industry, because this part of it does not conflict with any atomic-energy program. If you did that, I think you might be able to do it in maybe another 6 months, that part of it. But you would need another reactor, though, because you cannot take a main propulsion reactor and have it operate at sea and then get into port and start it turning out power to supply to the city.

Representative COLE. Why not?

Admiral RICKOVER. You have got to service it sometime, and the normal way of operating any ship, whether it is a warship or a merchant ship, you secure your main propulsion plant when you get into port, because that is the only time you have to do any work on it because it is operating all the rest of the time.

Representative COLE. Why can you not, while you are checking over your propulsion plant, be using that energy to generate electricity?

Admiral RICKOVER. I mean it is repair. It is not checking over. You have to have it down and you have to have your machinery down.

Representative COLE. You do not have to shut down your reactor, though, do you?

Admiral RICKOVER. The reactor itself will keep on working, but your difficulties do not come with the reactor itself, but a lot of auxiliary circuits that you have and all kinds of control systems.

Representative COLE. Without going into details, it is your opinion that for $3 million to $5 million more, this world ship can be made into an electric driven ship, which when it is in port will generate a supply of 9,000 to 10,000 kilowatts?

Admiral RICKOVER. My final suggestion is to have two reactors, and if you make it electric drive you could do this, but you would have to make lots of arrangements with foreign countries.

Representative COLE. That would take more than five or ten million dollars?

Admiral RICKOVER. For another $10 million, I think, total, you could probably do this.

Representative COLE. Put in two reactors?

Admiral RICKOVER. You would have two ractors, and electric drive.

Representative COLE. For an additional $10 million?

Admiral RICKOVER. That is right.

Representative HOLIFIELD. We are going to close right away, but first I want to ask you this question——

Admiral RICKOVER. Please don't take these figures too seriously, Mr. Cole.

Dr. LIBBY. I find them very interesting.

Representative COLE. No one is going to dispute you.

Representative HOLIFIELD. The type of reactor you are going to use in the Large Ship Reactor is quite different from that which apparently is contemplated for the merchant ship.

Admiral RICKOVER. The merchant ship reactor would be an enriched reactor, and this is not. This will use, or we contemplate now it will use a lot of natural uranium and a very small amount of enrichment.

Representative HOLIFIELD. And the reason for not waiting for this to be developed is the matter of speed that is involved, and getting the merchant ship on the ways; is that right?

Admiral RICKOVER. As I understand it, one of the important or the important element of the merchant ship is to do it fast, which is the overriding consideration. That is my understanding of it.

Mr. DAVIS. There is quite a difference in the size of the powerplant involved here, too.

(Discussion off the record.)

Representative HOLIFIELD. We cannot finish this today, and I wonder if you gentlemen can be here in the morning at 10 o'clock, and then we will finish it. Thank you.

(Whereupon, at 3:50 p. m., Monday, May 9, 1955, the hearing was adjourned until 10 a. m. of the following day, Tuesday, May 10, 1955.)

AUTHORIZING LEGISLATION

TUESDAY, MAY 10, 1955

CONGRESS OF THE UNITED STATES,
JOINT COMMITTEE ON ATOMIC ENERGY,
SUBCOMMITTEE ON AUTHORIZING LEGISLATION,
Washington, D. C.

The subcommittee met, pursuant to recess, at 10:15 a. m., in the committee room, the Capitol, Representative Chet Holifield (chairman of the subcommittee) presiding.

Present: Representative Holifield (presiding).

Witnesses: W. F. Libby, Acting Chairman, Atomic Energy Commission; Thomas E. Murray, Commissioner; K. E. Fields, General Manager; R. W. Cook, Deputy General Manager; A. Tamarro, Assistant General Manager; William E. Mitchell, General Counsel; Don S. Burrows, Division of Finance; W. Kenneth Davis, Chief, Reactor Division; T. H. Johnson, Director of Research; Dr. Charles L. Dunham, Assistant Director, Biology and Medicine; John A. Derry, Office of Construction and Supply; Brig. Gen. D. J. Keirn, Research and Development; Francis J. McCarthy, Finance Division; Lawrence P. Gise; Charles Perry.

Members of the committee staff: Corbin C. Allardice, executive director; Messrs. Hamilton, Heller, and Selkowitz.

Representative HOLIFIELD. The committee will be in order. We will try to get started. Although there is no one else present right now, they will probably be dropping in as soon as the rollcall is over.

Let us leave the Large Ship Reactor consideration and get to this particle accelerator program at this time.

Dr. Libby, do you or General Fields wish to make the presentation on that?

STATEMENTS OF DR. WILLARD F. LIBBY, ACTING CHAIRMAN; THOMAS E. MURRAY, COMMISSIONER; K. E. FIELDS, GENERAL MANAGER; R. W. COOK, DEPUTY GENERAL MANAGER; A. TAMMARO, ASSISTANT GENERAL MANAGER FOR RESEARCH AND INDUSTRIAL DEVELOPMENT; WILLIAM MITCHELL, GENERAL COUNSEL; DON S. BURROWS, CONTROLLER; W. KENNETH DAVIS, DIRECTOR, REACTOR DEVELOPMENT DIVISION; DR. T. H. JOHNSON, DIRECTOR, RESEARCH DIVISION; DR. C. L. DUNHAM, DEPUTY DIRECTOR, BIOLOGY AND MEDICINE DIVISION; JOHN A. DERRY, DIRECTOR, DIVISION OF CONSTRUCTION AND SUPPLY; BRIG. GEN. D. J. KEIRN, REACTOR DEVELOPMENT DIVISION; F. J. McCARTHY, Jr., ASSISTANT CONTROLLER FOR BUDGETS; LAWRENCE P. GISE, AND CHARLES PERRY, UNITED STATES ATOMIC ENERGY COMMISSION

Mr. LIBBY. General Fields will speak a minute and then I will speak to it.

Representative HOLIFIELD. You may proceed.

Mr. FIELDS. This project is to provide for the construction of two high-energy particle accelerators to be located at university sites. Each machine is expected to cost the Government about $5 million. The high cost of construction, we believe, necessitates Government financing, and Atomic Energy Commission support is considered appropriate inasmuch as the research involved is fundamental to the development of atomic energy.

It is apparent that additional multi-billion-volt accelerators over those now authorized will be required if the Nation is to successfully exploit the important breakthrough into high-energy physics made possible by the new accelerator art.

The Commission plans to solicit proposals from all interested university groups for this and to award contracts to the two whose proposed projects are judged to contribute most significantly to the advancement of science and to the scientific strength of the Nation.

Representative HOLIFIELD. To what extent is the Commission to continue in this program of building accelerators? Are we going to keep on building them, paying for larger ones?

Mr. LIBBY. As of the moment, I would say the general situation is about as follows:

We have for the first time some opportunity to look into the intricacies of the nuclear forces from which atomic energy is derived. The only way you can get at these things is by bombarding with these tremendous energies and these machines are required to attain them.

At the present time we have 2: 1 at Brookhaven operating, another 1 building. But one actually operating. And one in Berkeley, the bevatron. And these are the only two operating machines in the country that reach into this energy and this important field. Well, they are practically the only two in the world. It depends on where you draw the line. The Russians have a 660-million-volt machine, but I would say this is just a bit too weak to compete in this fantastic ball game on which so much of our understanding of the nature of nuclei depends.

We have got to anticipate, I would say, at least 2 or 3 more machines in order to make our attack a bold one.

Now the big machines like the Brookhaven and Berkeley machines are the kind of things that can be supported reasonably only in national laboratories in my opinion. They are just too big. The machines in this proposition are small machines, the smallest machines in this energy range which can be of real use—in the order of $5 million, $5 million apiece. You can get a working machine which will give very valuable information, and coupled with the big machines in the national laboratories, it should make for a coordinated attack on this very important field, which I think should be pretty close to the picture. This is our present thinking, at least my present thinking, about the whole program.

Representative HOLIFIELD. What strength? How would you rate these machines?

Mr. LIBBY. I should hope they can get up to make 4 billion. I do not know. We are talking billions of volts. That is the difference. Our ordinary atomic-energy efforts are in the millions of volts.

Representative HOLIFIELD. How would it compare with the one at Berkeley?

Mr. LIBBY. It would be that order. It probably will not be quite so good. You see, the Berkeley machine is $10 million. That is about twice as expensive as one of these machines. Of course, that is an early model, and it may be with $5 million and the passage of time and the application of human ingenuity, the university teams can really push the Berkeley model. I would not be surprised if they could push it.

Representative HOLIFIELD. Essentially, then, these would be in the field of duplicating the facilities at Berkeley or near duplication of those facilities?

Mr. LIBBY. Yes, sir.

Representative HOLIFIELD. It would give more geographical diversification to them?

Mr. LIBBY. Yes.

Representative HOLIFIELD. What is the workload of the Berkeley machine? Is it so heavy that the work that is contemplated in these machines could not be done there?

Mr. LIBBY. I think that is so. I think that is really so. In this field of experimental nuclear physics, these 4 or 5 or 6 machines, whatever number you choose, would be our final number. If you should turn off the Berkeley machine right now and the cosmotron at Brookhaven, you would practically stop this branch of physics, which I think is undoubtedly the most important for the understanding of nuclear phenomena in general.

We actually do not know, we do not have the faintest idea of what the real explanation of nuclear forces is. We are completely ignorant. We have gotten to the stage of knowing in the last 20 years that we are completely ignorant; 20 years ago you could find an explanation.

Mr. Fields. It is my understanding, Mr. Chairman, that the bevatron at Berkeley looks as though it will shortly be saturated in demands for time and that we have actually been unable to schedule and meet all the requests for time at the cosmotron at Brookhaven. In other words, there is a great demand for time on these, and as they

get farther into it we do not believe these two will be sufficient, that is, to meet the demands ahead.

Representative HOLIFIELD. How long would it take you to build them?

Mr. JOHNSON. About 4 or 5 years.

There is one other point I would like to make in response to your first question, Mr. Holifield, regarding the nature of the machines.

It is probable—although we do not know yet what proposals will be submitted to us, it is probable that one of these machines will accelerate electrons, whereas the machines we now have are proton machines. This will add greatly to the ability to analyze some of the effects.

Representative HOLIFIELD. Will these be the linear type or the circular type?

Mr. JOHNSON. Probably the circular type for this amount of money. The linear machines would cost more.

Representative HOLIFIELD. In addition to the basic research which you will do with them, can you name any specific fundamental findings which have been made on the existing machines?

Mr. LIBBY. No, I do not believe so, that have had practical application yet. But the wealth of fundamental information we have but gleaned already with these two machines is so great that we cannot see any other prediction coming true than that the whole of nuclear physics will move through these machines—and the country does not have them. It is just on the sideline. CERN is building a Brookhaven type job in Geneva. That is an organization of a dozen European countries, and we have other machines going up.

The Russians have started into this range by getting up to seven-tenths of a billion.

We have got to expect it will become more clearly understood by all of the leading nations. To know what makes the atomic bomb, the hydrogen bomb, atomic power work, you have got to have these machines to move through. You have really got to do it.

We have such an enormous stake in this thing it seems to me it would be foolish of us to shut off, to put a roadblock on this most fruitful line of attack.

Representative HOLIFIELD. Have these projects been a matter of consultation with your scientific advisory panel?

Mr. LIBBY. Yes, sir.

Representative HOLIFIELD. And are they unanimous in advocating it?

Mr. LIBBY. They are unanimous in approving this project, yes, sir.

Representative HOLIFIELD. Is the Commission itself planning to build this or are you planning to contract this to outside contractors?

Mr. JOHNSON. It will probably be contracts with the university groups that are building them.

Representative HOLIFIELD. With the university groups?

Mr. JOHNSON. Yes.

Representative HOLIFIELD. Or with private industry?

Mr. JOHNSON. With university groups.

Representative HOLIFIELD. And you feel it is necessary to go through the university groups in the contracting of this?

Mr. JOHNSON. In the construction of the machines themselves, the scientists are the most competent and can do the best job.

As far as I know, construction of auxiliaries, buildings to house the machines, that would done through an architect engineer with a regular construction contract, perhaps directly with AEC, perhaps through subcontract with the university. That is not determined yet.

Representative HOLIFIELD. It is true that the Brookhaven cosmotron cost around $20 million?

Mr. LIBBY. The cosmotron, the machine already in operation, cost about $7 million. The larger AGS machine on which we are now working will cost about $20 million, yes. It is a big one.

Representative HOLIFIELD. And how much bigger will it be than these?

Mr. LIBBY. It is a different class of machine.

Representative HOLIFIELD. A different class?

Mr. LIBBY. I do not want to mislead you by saying that I think these at $5 million will approach the bevatron even. I think they may. I think there is a chance, but I do not think there is a chance they will touch the big Brookhaven machine.

Representative HOLIFIELD. What do you estimate the cost of operation of these machines would be?

Mr. LIBBY. Three-quarters of a million per year is our present estimate.

Representative HOLIFIELD. Let us go to item No. 27.

Mr. FIELDS. This item is for the conversion of an existing building to a development facility at Oak Ridge National Laboratory.

Most of the employees of the materials chemistry and analytical chemistry divisions of that Laboratory are located in the Y–12 area at this time, occupying laboratory, pilot plant, and office facilities in temporary buildings. Their need for adequate facilities has become urgent. The materials chemistry division has 100 employees dispersed in 6 buildings, and the analytical chemistry division has 72 people in 5 structures.

The working conditions in most of these buildings are inadequate, maintenance and operating expenses are high, and the efficiency of operations has been impeded.

Now, on a basis of an engineering survey made in 1953 to determine the most economical way of providing permanent quarters for the group now housed in the temporaries, the renovation of the available Y–12 building was found to be preferable to extensive remodeling from a number of standpoints.

For one thing, the cost of permanentizing the present facilities would be very nearly the same as renovating building 9207, but this process would only add 10 years to the life of the temporaries, whereas by modifying this building 9207, a masonry structure, it will last considerably longer. To permanentize would cost something like a million dollars, whereas to take this building and modify it would cost approximately $1,150,000. This would be considerably cheaper than building an entirely new structure for this purpose.

All told, the space that would be modified and made available for this development facility would be approximately 60,000 square feet.

Representative HOLIFIELD. This building 9207 that you mentioned, was that formerly used for some of the production work?

Mr. FIELDS. Yes, sir; it was used in the Y–12 area for a production process there. It is the electromagnetic process.

Representative HOLIFIELD. Let us take No. 37.

Mr. FIELDS. No. 37 is "Fabrication facility for development equipment, Oak Ridge National Laboratory," in the amount of $440,000.

This is essentially to provide research shops for the National Laboratory to relieve overcrowded and unsafe working conditions in the existing fabrication facility, to provide safe and efficient facilities for the machining of toxic materials and provide additional office space for design and administrative engineering personnel concerned with the fabrication and sheeting work of the shops there.

The building would be a one-story structure with a mezzanine of about 6,600 square feet. The actual building itself would be approximately 100 by 50 feet.

Representative HOLIFIELD. Are there any questions from the staff?

Mr. ALLARDICE. No questions.

Representative HOLIFIELD. Take No. 12.

Mr. FIELDS. The Division of Biology and Medicine. The amount requested here is $6,040,000 which is for a medical center at Brookhaven. It will provide a permanent medical research center to serve the medical research program being carried on there.

Since the inception of the program in 1948, the medical staff has been housed in some 20 converted temporary structures and has operated under severe physical difficulties. We would hope that they would go forward with this center to make it a permanent one.

It would include a 48-patient-bed hospital, medical research reactor to be designed specifically for the purpose of medical research, related laboratory area, and animal experimental facilities, and necessary industrial medicine facilities in the administrative area.

The buildings are estimated at a cost of about $4 million. The reactor, including building and utilities therefor, $765,000; with utilities, installed equipment, roads, and contingencies bringing the total to $6,040,000.

The amount requested excludes $400,000 for architect-engineer work which would be initiated in fiscal year 1955.

Representative HOLIFIELD. Is this to take the place of those barracks where they are conducting medical experiments, the temporary barracks?

Mr. FIELDS. I believe that is true.

Representative HOLIFIELD. Is it replacement or in addition to them?

Dr. DUNHAM. This will replace the old Camp Upton Station Hospital, which are the facilities I believe you have seen, Mr. Chairman.

Representative HOLIFIELD. Yes; we visited up there.

Was that the facility that had the nephrotic children in it?

Dr. DUNHAM. That is right; that is the old structure.

Representative HOLIFIELD. What type of construction contract is being considered? Is it a negotiated or bid type?

Mr. DERRY. That will be a lump-sum competitive bid type construction contract.

Mr. HELLER. Will that be true also of the reactor?

Dr. DUNHAM. I believe that the reactor——

Mr. TAMARRO. From the large number of firms that are now in the business, we think we ought to be able to get a fixed price bid on that.

Mr. ALLARDICE. Did you say a fixed price bid on the reactor?

Mr. TAMARRO. I said, with the number of people now in the business to design and build and construct research reactors, I think we should be able to get a lump-sum figure on it.

Mr. ALLARDICE. On the design or construction of it?

Mr. TAMARRO. On the construction, probably.

Mr. ALLARDICE. Are you going to have it designed on a negotiated contract?

Mr. TAMARRO. I do not know as of this minute just where that stands. We know what we want, we know the flux we want, and we may design it ourselves and put out to bid, or may get one to do the whole package.

Mr. ALLARDICE. I would like to have the opinion of the Commission on the ethics of placing design contracts up for bid. Is this considered in any other field? Do you know of any architect-engineering company that would make a bid proposal on a design of any other building?

Mr. COOK. We do not ask architect-engineers to submit bids for design.

Mr. ALLARDICE. Is not this the same thing when you are asking for a medical reactor to be bid on competitively?

Mr. COOK. No, sir. When you ask for a medical reactor to be bid on competitively, what Mr. Tamarro was thinking of was furnishing and erection of the reactor itself as a construction item.

Mr. ALLARDICE. That is different. That is not what I asked. I mean, how are you going to get the conceptual and engineering details of the reactor which are necessary before you get it built.

Dr. DUNHAM. I think in this particular case the Brookhaven Laboratory has worked through a commercial organization who have come up with the design criteria.

Mr. ALLARDICE. This is conceptual?

Dr. DUNHAM. That is right.

Mr. ALLARDICE. How about the engineering of that design into a reactor?

Dr. DUNHAM. The actual engineering of the design would be either Brookhaven doing it in conjunction with this particular organization, or that organization doing the final design.

Mr. ALLARDICE. This would be negotiated, not on bid?

Dr. DUNHAM. Negotiated.

Mr. ALLARDICE. Then after the detailed engineering designs are made, it would be put on bid?

Dr. DUNHAM. Yes.

Mr. ALLARDICE. Are we sure of this? Is this final?

Mr. HAMILTON. Do the Commissioners say this?

Mr. LIBBY. This is our understanding of the way it is going. You know the company.

Mr. HAMILTON. Yes.

Mr. LIBBY. I think this reactor is going to be important for the foreign program. As we mentioned yesterday, you always have this possibility—research reactor or medical reator, which is better. So I think the Brookhaven machine is going to be important as giving an example of what these foreigners could have, if they wanted to go that way.

Representative HOLIFIELD. Are there other questions?

Mr. HAMILTON. Dr. Libby, is the decision to get a detailed engineering design by negotiated contract before you go out for competitive

lump-sum bid or contract on the construction of the unit a reflection of an established Commission policy now? Or is this still on a case-to-case basis?

Mr. LIBBY. I would like Mr. Cook to answer that, but I think it is established.

Mr. COOK. It is established Commission policy to not request, when we have design or engineering services, those services on a competitive bid basis. That is established in the contract manual.

Mr. HAMILTON. Would the APPR case then support, so to speak, or be an abrogation of this policy which has been thrown out here?

Mr. COOK. That was a little different program. That was a program for providing complete services, including design and furnishing the reactor. That is not the general practice that we follow in our construction of new facilities.

Mr. HAMILTON. In other words, on all of these jobs that we have been talking about, on reactor design, the technique that was used on the Army package powerplant is not typical of the approaches that will be used, but the approach that will be used is the one you described for the Brookhaven medical therapy reactor?

Mr. COOK. That is right.

Mr. ALLARDICE. Is this research center in accordance with the Brookhaven master plan?

Dr. DUNHAM. It is consistent with the master plan that the medical center be brought back into the family of buildings that constitute Brookhaven National Laboratory and pulled in from the distance of about a mile away from the rest of the center. The general size and scope of this will pretty well follow the plan.

Mr. ALLARDICE. In other words, this fits the estimates of the master plan?

Dr. DUNHAM. That is right.

Mr. ALLARDICE. When was this first proposed?

Dr. DUNHAM. Proposed by whom?

Mr. ALLARDICE. Brookhaven.

Dr. DUNHAM. They have proposed for at least 4 years that there be a permanent medical center and think along those lines. Their board of review or visiting board have urged a permanent medical center, I think, almost from the very beginning.

On the other hand, the staff of the Brookhaven National Laboratory, and particularly the medical division, until they had some experience operating, were a little reluctant to push it very hard. So it has only been the last 2 years there has been a real effort within Brookhaven itself to achieve this permanent medical center.

Mr. ALLARDICE. And it has taken 2 years to get it through the Commission with approval?

Dr. DUNHAM. No; I would not say that. It has taken 2 years for them to come up with firm enough estimates and plans for this to become a reality. It was a year ago—No; it was 15 months ago they were asked to submit as rapidly as possible their criteria, and it has only been a very few months that those criteria have really been firmed up enough so that one could go ahead. I think the Commission did not drag its feet.

Mr. ALLARDICE. Are they satisfied this is large enough and sufficiently well equipped to allow them to do the type of medical program they need?

Dr. DUNHAM. Yes, they are quite satisfied with this as it is presently conceived.

Mr. ALLARDICE. It has not been so rigorously controlled in scope as to interfere with the efficiency of the program?

Dr. DUNHAM. Not at all.

Mr. ALLARDICE. I have no more questions.

Representative HOLIFIELD. Are there any other questions of the staff?

If not, what would be the reason this could not be coordinated with the National Health Institutes? Would it be possible or not?

Dr. DUNHAM. Any activity at Brookhaven can be coordinated with the National Institutes of Health. In fact, they are visiting back and forth all the time, the scientists are.

Representative HOLIFIELD. It would be complete exchange of information?

Dr. DUNHAM. Information and programs, because there is nothing classified in the medical program at Brookhaven.

Mr. HELLER. This will be an unclassified building?

Dr. DUNHAM. As far as I know, yes.

Mr. HELLER. Even including the reactor?

Dr. DUNHAM. The reactor itself, outside, I am sure is unclassified. The fuel elements probably will be.

Mr. HELLER. You will not have the guard and security problem you have with the present Brookhaven reactor?

Dr. DUNHAM. No. I think only for presence of fissionable material.

Representative HOLIFIELD. Would this be a medical neutron bombardment type of reactor or more of a research reactor?

Dr. DUNHAM. This will be a swimming pool reactor with 3 treatment ports, 1 for the patients, where they can get a flux of 5×10^{10} thermal neutrons per second at the patient's head, which is more than they can achieve right now with the present reactor.

Mr. HELLER. How much more?

Dr. DUNHAM. By about an order of a factor of 10.

Mr. HAMILTON. You say you are not sure that the reactor itself, the innards of the reactor, are unclassified at this point?

Dr. DUNHAM. The fuel elements will be essentially those designed originally for the MTR, and I do not know the classification of those fuel elements.

Mr. HAMILTON. Can anyone answer that?

Mr. LIBBY. This will be an unclassified reactor.

Mr. DAVIS. The only thing classified about those fuel elements at the moment is the method of fabricating them.

Mr. LIBBY. Radioactivity protects the fuel elements once it is turned on. You do not have to worry except about intruders killing themselves.

Mr. HAMILTON. Have the Commission authorized the companies who do the conceptual design to negotiate or discuss it with foreign countries with whom we do not have a bilateral agreement for cooperation?

Dr. DUNHAM. I am not aware of this.

Mr. LIBBY. As Mr. Davis points out, the application—the fabrication of fuel elements is the only thing. It closely resembles the reactor we are going to take to Geneva, which is unclassified. The

only difference is the concentration of the uranium isotope. It is essentially an unclassified reactor.

Representative HOLIFIELD. Let us go to item No. 44, "General plant projects."

Mr. FIELDS. We are requesting general plant projects in the amount of $17,960,000. This item is for projects to provide for the many miscellaneous minor alterations, additions, modifications, replacements, and minor new construction which are required annually by each of the Commission's operating programs, to provide continuity of operation, improvement in production techniques, road and street improvements, elimination of health and safety hazards, the minor changes in operating methods, and to protect the Government's investment by preventing excessive deteriorations and obsolescence in the facilities which support the several programs of the Commission.

Now the criteria under which funds are expended under this project are:

(1) In connection with community operation no single project can exceed a cost of $150,000 and no building in conjunction with such a project can exceed a cost of $10,000.

(2) In conjunction with all other programs the maximum building costs is $100,000 and the maximum project cost $500,000.

Now in the past—this particular amount, $17,960,000, I believe, should be related to the plant and equipment investment that the Commission would have the beginning of fiscal year 1956, which is $6.6 billion in investment value, capital value. Or, in other words, a percent of investment of 0.28 percent is being requested for these minor plant projects.

In previous years, in fiscal year 1955, our general plant projects had been $15,990,000, $2 million less than now being requested. In the special nuclear materials program, however, a primary increase occurs in that program, and this is because we now have Savannah River, Portsmouth, Paducah, all getting into the operating period in those parts of the program. These are very essential items if we are to keep our programs moving along in shape and the facilities in good condition.

They may be minor process improvements. They may be buildings. They may be anything of this nature that arises throughout the program.

Mr. ALLARDICE. In leafing through the budget justifications, I notice certain projects listed at exactly $100,000. I trust they are not so listed in order to take them under this general plant facility topic. What control does the Commission have to assure itself that the limits set on this general plant and equipment criteria will not be exceeded in any one year?

Mr. FIELDS. They have no authority to exceed them. They operate within the criteria that we have placed here.

Mr. ALLARDICE. These are internal criteria?

Mr. FIELDS. These are internal criteria really that we apply ourselves.

Mr. ALLARDICE. It starts off estimated at $100,000 under this topic. Suppose it turns out that $100,000 was a little bit cautious, maybe it is going to be $300,000 or $200,000. What control have you over such an increase in costs?

I mean, this is the initiation of a project. Are you sure it is going to be under $100,000 before it is approved?

Mr. FIELDS. They operate on the basis—well, some of this, of course, is done lump sum and some is done by direct cost account. I do not know of any cases myself where we have started and exceeded. It is under the control really of the different managers of operations who, if they find they cannot do it within these criteria, would come in to us and normally we would process it through the budget in the subsequent year.

Mr. ALLARDICE. How do you prevent this fund being used to build five components at $95,000 apiece, total $475,000, and therefore get a $475,000 plant without going through a line item?

Mr. FIELDS. As I say, we do this by normal administrative audit of the activities that go on in the field. I am sure we would take a dim view of it if anyone were to try it.

Mr. ALLARDICE. You do not know of any cases?

Mr. FIELDS. I do not know of any cases of this sort. I do know of cases where they have come up with something they wanted to do, but it went over, and it was not done.

Mr. ALLARDICE. And the Commission would not allow this to be done, this technique to be used, to avoid a line item in the budget?

Mr. FIELDS. That is correct.

Mr. ALLARDICE. I have no further questions.

Mr. HAMILTON. You gave the figure of 0.28 percent that this was of the capital plant of the Commission as of the beginning of fiscal 1956?

Mr. FIELDS. Yes, sir.

Mr. HAMILTON. But I do not think you gave comparable percentage for the equivalent item in the previous year.

Mr. FIELDS. For 1955 it was the same percent—0.28.

Mr. HAMILTON. Exactly the same?

Mr. FIELDS. The plant and equipment investment at the beginning of that year was 5.7 billion against a figure of 15.9 million for the general plant projects. So it was the same percent.

In fiscal year 1954, the percent of investment was 0.32 percent, when the investment was not as big. Total investment at the beginning of fiscal year 1954 was $4,579 million against general plant projects of 14.5 million.

Mr. HAMILTON. So that there has been an essentially consistent policy and the amount has been——

Mr. FIELDS. Yes. Fiscal year 1955 is at the same level as in 1956.

Mr. HAMILTON. The funds available in this general plant projects, if it should approach the end of the fiscal year and you find that you do not have need for the full funds, are they automatically available for any kind of substitution or additions to other projects which have an authorized ceiling? For instance, might the LSR project be increased by $50,000 by calling it a general plant project and bring it on up because you had the extra funds?

Mr. FIELDS. I do not believe we would do it by general plant projects. If there are funds available from this project, with the substitution rider we had last year, I believe the moneys could be used on other projects.

Mr. HAMILTON. Here is what I am thinking of specifically, General Fields. This is an old story and it is not a current problem in any way

as far as I am aware. You remember the MTR was originally budgeted for $18 million construction costs. To hold it within the $18 million they eliminated certain labortory and certain other facilities in the MTR as their budget estimate began to rise. Those were parts of the plant which were clearly needed for it to be a complete plant. Then in subsequent years they could come in essentially as a general plant project, a minor addition to the MTR. In fact, they managed to bring it up over a period of 3 years to the full complement of the facility that was really needed.

So if you look at the cost of the MTR, one can say it was $18 million, but to get everything that was originally planned within the $18 million, I think we spent in the order of 21 or 22 million.

Mr. FIELDS. I am not familiar with that.

Mr. HAMILTON. I wondered if this same technique was a common one or whether you had any way of policing it.

Mr. FIELDS. It is not a common one and would not be a policy of the Commission, but I am not familiar with that particular project.

Mr. MCCARTHY. If I might comment, I think additions to the MTR were not budgeted under the general plant projects. I think we came back in future years for additions to the MTR.

Mr. FIELDS. We make every effort—I would not say every effort. We do look at this substitution in good faith, and I do not believe it would be good faith to take the general plants project and add it to a specific project authorization that has been in the budget.

In another year or two there will be some things that will have to be done at Portsmouth, but they were not anticipated and then cut out with the intention of putting them back by use of this project. We have operated in good faith regarding the substitution language is what I am saying.

Mr. HAMILTON. I am not criticizing the practice that was used in that particular case because, in fact, the total facility, to be effective, had to have what was built.

Mr. ALLARDICE. Are you convinced on the basis of experience of 8 years of operation that this is the amount of money you will need in fiscal year 1956 for these purposes?

Mr. FIELDS. I am convinced.

Mr. ALLARDICE. For the program?

Mr. FIELDS. Yes, I am.

Mr. ALLARDICE. And less would definitely hurt the program, or not?

Mr. FIELDS. It depends upon how much less. I mean——

Mr. ALLARDICE. How much did you have left over out of your 1955 appropriation for this item?

Mr. FIELDS. We have not finished 1955, so we are unable to provide you with the answer to that.

Mr. ALLARDICE. In 1954?

Mr. FIELDS. Do you have that information, Mr. Burrows?

Mr. BURROWS. I do not have it.

Mr. ALLARDICE. I am trying to get at what has been your experience on your estimates on this item in the past. Have you always had a comfortable margin, enough, or what?

Mr. BURROWS. Quite the contrary. We have usually not had enough on this particular item.

Mr. FIELDS. I think we usually have not had enough in the weapons field, for instance, and projects have been deferred and not handled in 1 year which pop up again the subsequent. And there is always the question of priorities and things that have to be eliminated that you cannot do for one reason or another.

Mr. MCCARTHY. Essentially there are always more projects than there are funds to provide for them. As General Fields pointed out, you have a priority problem; so you cannot accomplish this year all the things that would come up. Naturally, some of those have to be deferred to the following year.

Mr. HAMILTON. Is there any way we can be assured that something which ought to be built in a given year is, that means are found to acquire it in that year rather than to postpone it, so we are not faced with having failed to authorize and build something which should have been built?

Mr. FIELDS. I think the way you do that is to authorize the amount that we have in here, and I believe within that amount we can insure that those that have to go forward will go forward.

When you get to a matter of priorities, they all have different factors as to why they are in there. You may have to balance the improvement of gutters in a road so the cars can get to the plant against something that goes into the process in the plant.

Mr. HAMILTON. What, for instance, was this item before us when it went to the Bureau of the Budget before it came up here to us? Was it larger than this?

Mr. MCCARTHY. If I recall correctly, the 1956 item was approved exactly as we submitted it. I think this is exactly what we submitted to the Bureau.

Mr. ALLARDICE. It changed $27,000 between that and submission up here. What would account for the $27,000 cutdown?

Mr. MCCARTHY. I think we had one item in there we did get a revision in at the time they looked at it. If I also remember, we took a round-off figure in our total budget for plant and equipment.

Mr. ALLARDICE. This does not represent pushing something aside?

Mr. MCCARTHY. Pushing anything aside? No.

Representative HOLIFIELD. At that point, may I ask, does the Budget's total authorization on these items represent what you asked for—$293,750,000 for the total?

Mr. MCCARTHY. Yes, sir.

Representative HOLIFIELD. In other words, the Budget did not pare you down on this total appropriation?

Mr. MCCARTHY. I would have to go back and check our records on that, Mr. Chairman. Essentially I think it is the same as we submitted to the Bureau. There may have been 1 or 2 items different.

Representative HOLIFIELD. Does that also apply to the rest of of your requests which do not come before this committee?

Mr. MCCARTHY. On the operating side?

Representative HOLIFIELD. Yes.

Mr. MCCARTHY. No. I think we did take some revisions from the Bureau of the Budget on the operating side.

Representative HOLIFIELD. Do you know approximately how much they cut you down percentagewise?

Mr. MCCARTHY. It was very small percentagewise. I think essentially we came into agreement with them on some of the items that

changed from the time we submitted them to the time they marked up the budget, after hearings. I think the changes were very small.

Representative HOLIFIELD. You can say pretty well, then, that your total requests for appropriations have been granted and they have not been reduced as a matter of budgetary direction?

Mr. MCCARTHY. To the best of my recollection, that is right, sir.

Mr. HAMILTON. You think there is no single major project, to the best of your knowledge, which you thought ought to be built in the coming fiscal year, or started in the coming fiscal year, for which you were denied the right to come to Congress by the Bureau of the Budget?

Mr. MCCARTHY. I do not recall a one, no.

Mr. FIELDS. I do not recall any.

Mr. MCCARTHY. I think we have in here everything we asked for.

Representative HOLIFIELD. Let us proceed to the "Capital equipment, replacements and additions," item No. 45.

Mr. FIELDS. Equipment under this heading in the amount of $30,141,000 is equipment which is not included as a part of a construction project. It includes all costs incurred in the acquisition or fabrication, and the removal costs, less salvage, in connection with retirement of equipment being replaced.

Of the 30.1 million required in 1956, 16.7 million is estimated for new equipment needed in connection with the Commission's expanding program or on laboratory research efforts; and 13.4 million is needed to replace items of equipment which must be retired because of age or obsolescence. The total requirements constitute 1.6 percent of the total inventory of equipment estimated to be on hand at the end of fiscal year 1957.

Representative HOLIFIELD. Is that 1957?

Mr. FIELDS. Excuse me. 1955.

We have a list of this equipment by categories in the analysis of the bill on page 48. I will not propose to read this unless you want to go into it in more detail.

Representative HOLIFIELD. I would like to ask, what is item 6 under the heading of "Process"?

Mr. FIELDS. That is "Process equipment," sir. This may be machines such as in the American Car & Foundry plant for production, or it may be process equipment in any such plant as that. Rocky Flats, for instance.

Representative HOLIFIELD. Under what policy did you submit this complete item to the committee for authorizing legislation? What was your thinking as to why this should be submitted to us? On the basis of permanence of the equipment? It is evident that it is comprised of equipment which will be amortized. I am just wondering what your thinking was on presenting this.

Mr. BURROWS. We basically had two appropriations, an operating appropriation and plant and equipment appropriation. We thought that it would be a lot clearer in our dealings with the Congress, generally speaking, including the Appropriations Committee, if this appropriation went forward as 1 unit, so that then when we have an authorization bill, then the President submits 1 bill for this same amount to the Appropriations Committee and eliminates the confusion of having 2 different amounts and 2 different sets of considerations against the single appropriation. We thought it was better to

continue the appropriation as a total the way we have been doing in the past.

Representative HOLIFIELD. On item No. 3, what is this for—equipment in your laboratories, or for brick and mortar?

Mr. BURROWS. No; there is no brick and mortar in this particular item. It is all laboratory equipment of various kinds. This is both additional equipment which we may need for new experiments and replacement of equipment which is worn out.

Representative HOLIFIELD. On your item No. 10 there—"Shop"—is that maintenance, remodeling, or additions to shop? That does not comprise anything in the way of salaries for people who work in the shop?

Mr. BURROWS. No, sir; this is just the equipment. These are machine tools and various other items of equipment.

Representative HOLIFIELD. Now your motor vehicles and aircraft, No. 4. Is that for your administrative vehicles and your aircraft at Los Alamos?

Mr. BURROWS. This is for all types of vehicles. The great majority of it is for trucks and other industrial-type vehicles as well as for passenger-carrying vehicles.

I would like to mention that this is all replacement. There are no new additions of passenger vehicles here.

Mr. ALLARDICE. Have you enough passenger vehicles?

Mr. BURROWS. We think so; yes.

Representative HOLIFIELD. You do have an additional breakdown, I suppose, on that item, do you not?

Mr. BURROWS. Yes, sir.

Representative HOLIFIELD. I would suggest that you furnish the committee a breakdown on that item, because the Congress is very sensitive on it.

Mr. FIELDS. Motor vehicles and aircraft?

Representative HOLIFIELD. Yes.

(The information referred to appears in appendix C, p. 176.)

Mr. FIELDS. Yes, sir.

Representative HOLIFIELD. For the different installations and type of equipment at the different installations, and possibly the age of your equipment. I imagine you would have that as a matter of course anyway.

Mr. BURROWS. Yes, sir.

Representative HOLIFIELD. So it would not put you to a great deal of trouble. So that we could sustain the replacements being considered, because, as I say, there is always some questioning on automobiles.

Mr. LIBBY. We will furnish that.

Mr. FIELDS. Could I perhaps give our experience on this in the past? I failed to do that.

Representative HOLIFIELD. Yes.

Mr. FIELDS. In fiscal year 1955, our estimated amount was $27,238,000 for this category of equipment against an inventory of 1.8 billion of equipment. That is a percent of inventory of 1.5 percent.

In fiscal year 1954, the actual equipment category was $32,732,000 against an equipment inventory of $1,446,876,000 for a percent of inventory of 2.3 percent.

Mr. HELLER. Is that not a difficult figure to understand, because every time you build a completely new facility all the equipment that goes with it goes in?

Mr. FIELDS. That is correct.

Mr. HELLER. So this is not all the new equipment you are buying?

Mr. FIELDS. That is correct.

Mr. HELLER. Otherwise you would be replacing your equipment on a 50-year basis, which does not make sense. This is the increment that you add to keep up your existing equipment, and does not include equipment being installed as a part of completely new facilities?

Mr. FIELDS. That is correct.

Mr. HAMILTON. General Fields, in this motor vehicles and aircraft, Mr. Burrows noted that a large portion of this was heavy industrial equipment. Does the Commission any longer maintain any central construction equipment pools such as were maintained in Idaho for a time?

Mr. BURROWS. Not to my knowledge. Maybe Mr. Derry can answer that.

Mr. DERRY. We do not maintain a large central construction pool.

Mr. HAMILTON. Anywhere?

Mr. DERRY. No. We are considering the advisability of maintaining a limited construction pool at some of our major installations. We have not reached a decision on this yet because of the amount of investment that might be required or the amount of cost that would be entailed in keeping the thing in reasonably good operating condition. We are examining it.

Mr. HAMILTON. What was your experience in Idaho in that, just in a word, in comparison with having had it done by an industrial contractor as opposed to doing it yourself?

Mr. DERRY. Maintaining an equipment pool?

Mr. HAMILTON. Yes.

Mr. COOK. Are you not talking about the maintenance shops operated by the Commission?

Mr. HAMILTON. The Commission bought and operated a central equipment pool and the construction contractors at Idaho drew their equipment from that pool and were charged against their account for it. They claimed throughout the period that that was being done; that the charges levied against them were in excess of the cost of having brought in special equipment for each of their own jobs; that they were required to use the Government pool because of the fact the equipment was on hand, and the Government's bad judgment on maintaining the pool was being charged against them.

Mr. DERRY. We do not do that any place any longer.

Mr. ALLARDICE. You mean use bad judgment?

Mr. DERRY. We do not maintain that kind of central construction equipment pool.

Mr. HAMILTON. I am not saying whether they used bad judgment or not.

Mr. DERRY. The costs of operating the central equipment pool, including our administrative overhead, were charged to the construction contractors using the equipment, and they claimed that these charges were higher than the amount it would have cost them to supply the equipment independently.

Mr. HAMILTON. Yes.

Mr. DERRY. Along with other reasons. The other reasons grew out of our effort at that time to centralize in the hands of one contractor the responsibilities for maintenance work and storage and distribution of supplies for our several operating contractors at that remote site. It was logical to extend the plan to construction contractors. Later this manner of operation was discontinued, eliminating any further arguments on this score. The construction contractors' contention was never proved, to my knowledge.

Mr. HAMILTON. Was the decision to abandon the experiment in direct Commission operation of the kind of thing being run there—did that constitute abandonment of the entire idea of having the Commission operate directly?

Mr. DERRY. I could not answer that.

Mr. HAMILTON. Did the Commission consider this as an experiment and abandon it?

Mr. MURRAY. I am sorry. I was not brought in on that.

Mr. COOK. The operation at Idaho was the only Commission installation that was tried at. I think there were good considerations for it at the time during the course of construction and operation of facilities that no longer warrant its continuance. We have not, as a matter of policy, and do not intend to conduct a similar operation in the future.

Generally, if we have a large construction job, the operation of any equipment pool is done by that construction contractor for the various subcontractors involved, and when the construction is over with it is washed out, and the prime operating contractor handles any centralized maintenance pool that is necessary for the operation.

Mr. ALLARDICE. I would like to go through these 11 items just to get an example of what you intend to include.

What do you mean by "heavy mobile"?

Mr. DERRY. Heavy mobile equipment is the truck handling equipment, the bulldozers, the trucks, the forklift trucks we use in warehouses. It goes from the kind which is fairly small, we will say, in mobile equipment, to the large dirt-moving equipment that we would use in a fairly large sized project.

Mr. ALLARDICE. Walking cranes?

Mr. COOK. Cranes, motor patrols, street cleaners, heavy trucks.

Mr. ALLARDICE. "Hospital and medical" is the next category.

Representative HOLIFIELD. Before you leave this machinery item. Do you make any use at all of the equipment which is in the hands of GSA? Do you ever draw upon them and ask them if they have the type of equipment you need along this line?

For instance, I was in a building in Los Angeles recently where there was quite a number of mobile cranes that were stored. I found they have been stored there since World War II ended, and these were all motorized cranes stored in this building, Government-owned equipment. I daresay that possibly in the industrial reserve there may be a great amount of this type of equipment at one place or another stored as these cranes are. I just wonder if, in the purchase of equipment, there is ever any attempt on your part to utilize surplus equipment which may or may not have been declared excess by the custodial agency.

Mr. DERRY. Mr. Chairman, before we could have access to it it would have to be declared excess. GSA circulates our lists as well as

other Government agencies' lists, and we examine these for excess or declared surplus before we go out and buy anything. They must declare that as excess equipment before it is available to us and take it off their rolls.

Representative HOLIFIELD. You do check on those lists?

Mr. DERRY. Yes, sir.

Mr. ALLARDICE. "Hospital and medical."

Mr. DERRY. "Hospital and medical" covers just the hospital and medical equipment that goes into our hospitals at Oak Ridge and Los Alamos and first-aid centers and our plants. It is a fairly small item, as you can see. It does not take into account the—well, it probably would have some relation to our large research hospitals, but very little, because that would be in the research category, laboratory equipment category.

Mr. ALLARDICE. It is more or less a continuous replacement of things for these hospitals?

Mr. DERRY. For care of health, I believe. Laboratory equipment, as you can see, is the largest one of the group. That covers all kinds of laboratory equipment.

Mr. ALLARDICE. If you want to build a coil to bend the beam of the Brookhaven cosmotron, does that come out of these funds? Say it costs $20,000 for the laboratory to build it. Does it come out of this fund or operating funds?

Mr. DERRY. If the material is available in the warehouse, it is drawn out as material, and this is part of the inventory that is kept in Brookhaven Laboratory for the benefit of the scientists to manufacture these things. This covers things like electronic devices and pumps, and in some cases it could be machinery that is associated with laboratory operation, like manipulators, we will say, in the caves when these get too contaminated and must be removed and cannot be handled by the operators, it has lost its usefulness and must be replaced.

The other thing it covers, of course, is new equipment, and any laboratory director will tell us or tell you, if you asked him, that his men are only as good as the equipment he has, and when new equipment is discovered or developed they feel they must have it in order to keep ahead of the game. This is one of the reasons why this is quite large. The other reason is contamination and obsolescence.

Representative HOLIFIELD. Will you give us a brief rundown on the numbers of aircraft and the purposes for which they are operated, in the next item?

Mr. DERRY. On aircraft, the replacement is for three aircraft. The particular instance those are used for is out at Grand Junction on the exploration for occurrence of uranium ore. The other aircraft we have are ones that we operate at Hanford, and I think 18 other aircraft in the inventory at Grand Junction. These three are just replacement items.

Mr. HELLER. Are these the replacements for the three they cracked up last year?

Mr. DERRY. That is right.

Representative HOLIFIELD. These are involved mostly in exploration?

Mr. DERRY. These three are entirely.

Representative HOLIFIELD. And not in transportation of administration personnel?

Mr. DERRY. No, sir. The only airplane we have for transportation of administrative personnel is the one that we operate at Hanford, and this is only incidentally used for transportation of personnel.

Representative HOLIFIELD. Also at Los Alamos.

Mr. DERRY. Los Alamos is operated on a contract basis. We have a contract for that. And the transportation of personnel out of Oak Ridge, we operate that on a bailment contract with the Air Force, and this is operated with operators by contract.

Mr. HAMILTON. Are contractors like GE and Westinghouse reimbursed for use of their own aircraft for transportation back and forth between their principal plants?

Mr. BURROWS. I do not believe so.

Mr. HAMILTON. Like people going from Schenectady to Hanford or Idaho?

Mr. LIBBY. We can check this.

Mr. HAMILTON. I am curious whether it has become a way of getting around having the Commission own or contractors own and operate aircraft for you.

Mr. BURROWS. I am not aware certainly of any fleet. They may have some occasional use of company planes in which they might get the expenses. That is why I hesitate. I think Bendix uses a plane.

Representative HOLIFIELD. Along with the breakdown on the motor vehicles, I hope you give us a breakdown on aircraft operations, both contractual and by ownership, please, because I anticipate questions on that from members on the floor.

Mr. DERRY. Motor vehicles category as well as the aircraft?

Representative HOLIFIELD. Yes, to be submitted.

(The information referred to appears in appendix C, p. 176.)

Mr. BURROWS. I would like to add, if I may, if a contractor proposed for regular transportation to use an airplane, that is an item we would go at very carefully, and they would have to show that was not excessively more expensive than normal use of commercial transportation.

Mr. HAMILTON. That means you would analyze the amount of traffic back and forth to be anticipated and put this against commercial transportation?

Mr. BURROWS. And the cost that would apply; yes, sir.

Mr. HAMILTON. Because the increasing activity in Idaho has as one of its handicaps the great separation from the laboratory centers. It is always the subject of friction.

Mr. BURROWS. You may be aware that the operation of private planes is a very expensive proposition.

Mr. ALLARDICE. Office furniture and machines is pretty obvious.

Mr. DERRY. Yes. Office furniture replacement and for new offices.

Mr. ALLARDICE. Process.

Mr. DERRY. In our process plants, diffusion plants, and other manufacturing plants, the reactors.

Mr. ALLARDICE. If you need a "frammis" it would be in "Process"?

Mr. DERRY. Some wear out. The process equipment does wear out and has to be replaced.

Railroad moving stock is zero.

Reactors and accelerators. This is equipment associated with reactors. It is a fairly small item.

Mr. HELLER. It does not include the production reactors?

Mr. DERRY. No.

Mr. HELLER. They come under "Process"?

Mr. DERRY. They come under "Process."

Mr. HELLER. That is all.

Mr. DERRY. Security is security equipment, associated particularly with the protection of our plants.

Mr. ALLARDICE. Does that include vehicles for security or are they under "Motor vehicles"?

Mr. DERRY. They are back under "Motor vehicles."

Mr. ALLARDICE. What does this include, then—electronic protection devices, guns and such?

Mr. DERRY. Yes.

Mr. HELLER. Badges?

Mr. DERRY. No. Electronic devices and physical protection for our plants.

Mr. ALLARDICE. This is not a large enough fund for building gates such as you did at Oak Ridge, is it?

Mr. DERRY. No, that would be under plants and equipment.

Mr. ALLARDICE. That would be a line item.

Mr. DERRY. This is purely equipment.

Mr. HAMILTON. Does it include repair of hinges on gates that are otherwise ineffective, such as those at Los Alamos?

Mr. FIELDS. It would not be in this item.

Mr. ALLARDICE. What is the "Miscellaneous"?

Mr. DERRY. Under the line items, what we do not have defined categories for are under "Miscellaneous."

Mr. ALLARDICE. Would that be exhibits, for example? What would exhibit equipment come under—this?

Mr. DERRY. Yes. I can give you an explanation of that, a rundown, if you would like to see that.

Mr. BURROWS. In any problem of classification you have some things that do not meet classifications and you have a "Miscellaneous" category. We can give you some examples. We have it all spelled out in the manual, if you would like to have a copy.

Mr. HOLIFIELD. We want to have the answers to things like that.

Mr. DERRY. I can give an explanation that might satisfy you now, Mr. Chairman.

It includes the requirements for 40 contractors and accounts, and covers things like vacuum cleaners for hospitals, hot-water heaters for use in Japan where the lessor won't furnish them, laundry equipment, telephone equipment and subscribers specifications, station equipment to cover ships and communities, fabrication of museum exhibits, miscellaneous garage tools, sump pumps, ventilation fans, drinking fountains and cook stoves for schools, solid waste disposal cans, gasoline cylinders, interplant communication equipment, 10,000-gallon fuel

tanks, experimental core drills, house and water trailers, generators and light plants.

Representative HOLIFIELD. That gives us an answer. We will expect a complete manual on all of these matters in detail and indexed to where we can turn to them if we are questioned on the floor.

Let us go back to item No. 9 that we went past.

Mr. FIELDS. This is an item for "Aircraft nuclear propulsion program test area at Arco, Idaho," in the amount of $13 million.

(Discussion off the record.)

Representative HOLIFIELD. Mr. Allardice.

Mr. ALLARDICE. I would like to ask one or two general questions of General Keirn. Are there any projects in the aircraft nuclear propulsion field which have been denied funding or held up by lack of funds in this fiscal year and the next one covered by this budget?

General KEIRN. You say any projects that are held up by lack of funds?

Mr. ALLARDICE. Yes.

General KEIRN. I think not; no.

Mr. ALLARDICE. Are there projects which have been deferred because of lack of money available within the Administration's own agency budgetary requirements?

General KEIRN. I think not.

Mr. ALLARDICE. You are getting for the aircraft nuclear propulsion program everything you think you need?

General KEIRN. That is correct.

Mr. ALLARDICE. And would you say that there is any way to speed it, any way we could assist in speeding it by authorizing appropriation of additional moneys?

General KEIRN. I do not see now how additional funds will accelerate the program.

Mr. ALLARDICE. You believe it is being accelerated and pushed as rapidly as it can?

General KEIRN. I think this is correct.

Mr. ALLARDICE. I think you have detected within the committee a strong feeling of interest in this particular project.

General KEIRN. We have, indeed, and we are watching every step to see if there are ways in which the program can be further accelerated. We believe we are going as fast as we can and make successful progress.

Representative HOLIFIELD. Mr. Hamilton.

Mr. HAMILTON. Could you give us a specific figure of the money already authorized in previous budgets for facilities in connection with the aircraft nuclear propulsion program and a figure of the specific amount to be spent on facilities to complete the program?

General KEIRN. I do not have these figures broken down here. I can tell you roughly what they are. I do not know whether Mr. Burrows has them here or not.

You want just the construction?

Mr. HAMILTON. I am afraid that the thing comes in four pieces, General Keirn: the AEC construction, the military construction, the

AEC operating, and the military operating, actually to give a complete picture.

What I am really after is what is the total amount that you now anticipate will be required for the completion of the aircraft nuclear propulsion program, and how does this break down between operating and construction, AEC and Defense, which would be a total of four items.

Mr. DAVIS. According to the figures which we have assembled here, which are approximate, up through the end of fiscal year 1955 the Air Force has spent a total of about $75 million on research and development, about $19 million on construction; the AEC has spent a total of $70 million on research and development and about $18 million on construction. So the total through 1955 is $145 million on research and development and about $37 million on construction.

Although they cannot be included in the public record, the following are the approximate costs now projected for each of the same categories for the years following 1955.

(Discussion off the record.)

Mr. HAMILTON. Would you anticipate that before action could be taken to go forward with any new major activity in the propulsion field, the Commission would have to come to the Joint Committee for authorizing legislation to permit that to go forward in a program, or might it actually get the activity underway and then present the committee with something resembling a fait accompli by using operating funds?

General KEIRN. I would not expect it to get to any large effort without this committee knowing about it.

Mr. HAMILTON. I mean not only knowing about it. Fortunately we have very close relationship.

General KEIRN. I am sure the funds for the program would have to be approved just as the funds for our present program are approved.

Mr. FIELDS. I would think at such stage as we see the outlines of it we would certainly appear before your Research and Development Subcommittee and review it.

Mr. HAMILTON. But it is only Mr. Holifield's Authorizing Subcommittee which has any control over whether a project moves or not.

Mr. FIELDS. I understand that.

Representative HOLIFIELD. Let's go to No. 25.

Mr. FIELDS. No. 25 is a building for aircraft reactor test.

(Discussion off the record.)

Representative HOLIFIELD. What is that power building, so-called?

Mr. FIELDS. This is to provide power for that particular experiment itself.

(Discussion off the record.)

Representative HOLIFIELD. Let's go on to No. 29.

Mr. FIELDS. No. 29 is a modification and expansion to the aircraft nuclear propulsion ground test facility at Idaho for such things as storage shops, maintenance, administrative and technical space, together with the necessary utilities and site development work.

(Discussion off the record.)

Mr. FIELDS. There are several miscellaneous but associated items in this totaling $627,000, and equipment in the amount of $373,000.

Mr. ALLARDICE. That is a nice, pretty-looking round total figure.

Mr. FIELDS. That is correct. It is of that nature, although we do have an itemization of the proposed facility expansion in some detail we could provide you here.

Mr. ALLARDICE. You have the details on it, you feel?

Mr. FIELDS. I do not believe it is just a guesstimate.

Could you talk to this, General Keirn?

General KEIRN. The facilities have not been designed, but the requirements are known in floor space and the equipment to be involved. There will be some differences in the actual costs when you get the contractor to bid on them and to build them. But it is based upon a planning factor for the general type of construction.

Mr. FIELDS. As I say, this is an item we foresee that is bigger than a general plants project and involves several smaller projects associated with this facility and is, for that reason, being brought in as an item itself rather than covered under general plant projects.

Representative HOLIFIELD. Mr. Hamilton.

Mr. HAMILTON. Could we go back to 25 for just a second?

It strikes me this is an interesting example of something we got into the other day. This item for a building of a little less than a million and a half dollars is the only way that the committee has a chance to look at a major experimental project to be financed from operating funds. What is that whole project going to cost?

General KEIRN. Breaking out how much goes into the actual construction of this project is rather difficult, but most of it is directed toward the development of information that is generated by this line of activity and to be used in the design and construction.

Mr. HAMILTON. What is expected to be spent to build it, not on the research and development for it, but on the actual cost?

General KEIRN. I do not know how to break it out.

Mr. HAMILTON. I might observe for the record that the Research and Development Subcommittee has been sufficiently informed on what the prospects are. I should think this is certainly an expense item, not a capitalization item.

Representative HOLIFIELD.

Any further questions?

Is there any further comment to be made upon the merchant ship request after our conversation yesterday in regard to a possible change of emphasis on the electric generating phase of it?

Mr. LIBBY. We are going to have to spend time studying it, I am afraid. I may say for myself it sounds like a pretty good idea.

Representative HOLIFIELD. When you do complete your study will you furnish us with a memorandum?

Mr. LIBBY. Yes, sir.

(The information referred to appears in appendix B, p. 175.)

Representative HOLIFIELD. On the attitude of the Commission on this, and also comparison of the costs between the results in comparison with a regular ship equipped with generating facilities of a similar strength.

Mr. LIBBY. Yes.

Mr. HAMILTON. Could you at the same time let the subcommittee know what the increased authorization would have to be to give the Commission at least in a rough determination, without going through the Budget Bureau procedure, how much the committee would have to raise the $21 million by in order to give the Commission authority to subsequently seek additional funds to accomplish this electrical generating objective in addition? I mean, whether it would be $2 million or $5 million or $10 million. We talked about various figures but nobody has anything actual.

Mr. LIBBY. I think we might have to touch with the Bureau, but we will see you get this extra number.

Representative HOLIFIELD. I might say I think most of the members of the subcommittee have not been impressed with this proposal, the practicability of it and we have serious doubts as to its public relations value.

We also feel that the Commission was not given an opportunity to adequately consider and advise on this point before its public announcement.

Of course, that is not your fault. We realize that.

We also feel, from the testimony that has been given, there was a lack of consideration of this between the members of the Commission even on the limited time element that was involved, in view of the answers that have come from some questions. And it brings up the old topic of whether the Commission is functioning as it should function, with a complete interchange of information among the commissioners.

Unless the members of the committee are convinced otherwise, this may lead to some questioning later on on this point.

Mr. ALLARDICE. I wonder if, before we close, General Fields, you might care to comment or suggest to the committee the method you would find most suitable to allow you flexibility in converting amounts within the line items of this request, on the assumption that the bill would be written with line item authorization. What kind of language do you think would be necessary to give you the proper kind of flexibility?

Mr. FIELDS. Mr. Chairman, I would again offer that we work with your staff on this language, as we discussed previously, subsequent to this meeting. But to answer Mr. Allardice's question specifically, I would think if these were to appear as line items in the bill, we would hope that some sort of a substitution provision could then be inserted also in the bill, the authorization bill, which would permit flexibility to substitute for the same purpose. The exact language of that I think we would have to work out, but we do feel we need substitution ability in order to keep flexibility.

Perhaps this does not have to be as broad as it has been, although what we have had in the past we have operated on in good faith, and we have stayed within the moneys that have been appropriated, and we would certainly intend to do this.

Representative HOLIFIELD. Would that be flexibility within each category of items?

Mr. FIELDS. We would certainly not intend to take moneys that were authorized for, say, production plants and build laboratories or

research facilities at some place like Brookhaven or something of this sort. We have never intended this in our mind.

I think one gets to a problem, though, when one tries to delimit it by programs. Perhaps we could work out something with your staff on this, but I believe it would present problems. But moneys that have been authorized in the production program—and by this I mean in the raw materials or the weapons program or in the production of fissionable materials—all of our substitution in that area has always been for the ultimate production of weapons in that area. We would not intend to take this $25 million item, for instance, for the acceleration of the power reactor development program and use it to build a plant to build thermonuclear weapons. We have nothing like that in mind when we say we need the substitution provision.

Mr. ALLARDICE. In other words, you would be probably all right with substitution under subgroupings?

Mr. FIELDS. Perhaps so. Here is where we certainly would hope to have the opportunity to talk to you about it. Perhaps the simplest way is to list these by items and amounts and permit a substitution rider of the sort that we had last year, and with the report and the legislative history here as a background of control that would be exercised in that, and the good faith we would apply.

There is one other factor that comes into this, which is the need to have some flexibility in the sense of the overrun. We have had the 35-percent overrun authorization in the appropriations here before. This does not mean at the start—we must still have the funds to complete when we start. We have this, would have this. But to operate exactly on the amounts that are, say, listed in an itemized bill would lead us to some difficulties, would take from us flexibility here.

Mr. ALLARDICE. Are you familiar with the military's discretion in this regard?

Mr. FIELDS. I am to a limited extent, yes, which I believe is something like 5 percent upward in the United States and 10 percent overseas.

Mr. ALLARDICE. Do you feel this would not be suitable for your purpose?

Mr. FIELDS. When you get to the smaller items—I say "smaller." They are still large amounts of money—one might have a problem there in the sorts of things we have. One has to forecast their needs here so far in advance; that is the difficult aspect of this.

Mr. ALLARDICE. Would it be possible to abide by the Defense type of flexibility in the majority of items or in the majority of the program, and then have wider discretion apply only to certain programs which are a little hazy in your mind at this time that you are not quite able to pin down?

Mr. FIELDS. It might be, but I do not believe in the Defense authorization there is a substitution provision. I am not sure.

Mr. ALLARDICE. There is not. They have a catchall to allow replacement of facilities and an authorization to use moneys to begin architect engineering studies in unlimited amounts.

Mr. FIELDS. Yes.

Mr. ALLARDICE. But no substitution for line projects.

Representative HOLIFIELD. I think we are going to have to approach this carefully, because more and more you are going to approach

the ordinary method of authorization which you have been free of in the past in justification and abiding by your decision on items. So I think in this particular language we should not try to attain the flexibility you have had in the past over the whole program, but only on those programs which you find it impossible to pin down.

That is why I was thinking, if you could segregate a certain part of it, just using, as an example, $200 million of this, where you feel you could pin it down pretty solidly, and then have your flexibility clause on the balance of it; of course, your substitution within certain areas.

I am just throwing that out for consideration, thinking of handling the bill on the floor. Explore that.

Mr. FIELDS. Certainly, sir.

Representative HOLIFIELD. I do not mean to recommend it for acceptance.

Mr. FIELDS. Yes.

Mr. HAMILTON. Faced with the fact, if you make a decision you want the large ship reactor prototype for $25 million, that does not necessarily mean you want it with equal enthusiasm for $50 million.

Mr. FIELDS. You mean from the standpoint of the cost?

Mr. HAMILTON. It is a different kind of decision, and there has to be a limit on it.

Mr. ALLARDICE. I mean there are certain projects that are relatively clearly identifiable in normal construction that you could pin down to pretty close limits, such as hospitals or schools.

Mr. FIELDS. In the past in appropriations hearings the actual bill that comes out is a lump sum for plant and equipment. We still exercise line item control on the basis of the budget that was submitted to them, and we would certainly intend that this be done here.

In other words, if a project has been budgeted at one amount and it comes out when we are building it, because these estimates are made way in advance, that it is much over the line item project, we cannot go ahead with it.

Mr. HAMILTON. But that is an internal control.

Mr. FIELDS. No; that is in the act.

Representative HOLIFIELD. Thank you, gentlemen, for your attendance.

Mr. LIBBY. Thank you, Mr. Holifield.

(Whereupon at 12:05 p. m., Tuesday, May 10, 1955, the subcommittee adjourned to reconvene at the call of the Chair.)

AUTHORIZING LEGISLATION

TUESDAY, MAY 31, 1955

CONGRESS OF THE UNITED STATES,
SUBCOMMITTEE ON AUTHORIZING LEGISLATION
OF THE JOINT COMMITTEE ON ATOMIC ENERGY,
Washington, D. C.

The subcommittee met, pursuant to call, at 11:40 a. m., in the committee room, the Capitol, Representative Chet Holifield (chairman), presiding.

Present: Representatives Holifield, Durham, Price, Dempsey, and Cole; Senator Millikin.

Witnesses: Lewis L. Strauss, Chairman, Atomic Energy Commission; Thomas E. Murray, Commissioner; Willard F. Libby, Commissioner; John von Neumann, Commissioner; K. E. Fields, General Manager; William Mitchell, General Counsel; A. Tamarro, Assistant General Manager of Research and Industrial Development; W. Kenneth Davis, Director, Division of Reactor Development; Don S. Burrows, Controller; Francis J. McCarthy, Jr., Assistant Controller for Budgets; William C. Wampler, Special Assistant to the General Manager; John MacKenzie, Office of the Chairman; Everett R. Holles, Office of the Chairman.

Members of the committee staff: Corbin C. Allardice, executive director; Messrs. Hamilton and Selkowitz.

Representative HOLIFIELD. The committee will be in order.

Gentlemen, you have before you the latest draft of the authorization bill and we would like to have your comments on it generally at this time, withholding your comments on item B–11 until after any other comments which you may have to give to the subcommittee have been heard.

STATEMENT OF LEWIS L. STRAUSS, CHAIRMAN; THOMAS E. MURRAY, COMMISSIONER; WILLARD F. LIBBY, COMMISSIONER; JOHN VON NEUMANN, COMMISSIONER; K. E. FIELDS, GENERAL MANAGER; WILLIAM MITCHELL, GENERAL COUNSEL; A. TAMARRO, ASSISTANT GENERAL MANAGER FOR RESEARCH AND INDUSTRIAL DEVELOPMENT; W. KENNETH DAVIS, DIRECTOR, DIVISION OF REACTOR DEVELOPMENT; FRANCIS J. McCARTHY, Jr., ASSISTANT CONTROLLER FOR BUDGETS; WILLIAM C. WAMPLER, SPECIAL ASSISTANT TO THE GENERAL MANAGER; JOHN MAC KENZIE, OFFICE OF THE CHAIRMAN; EVERETT R. HOLLES, OFFICE OF THE CHAIRMAN

Mr. STRAUSS. Mr. Chairman, this particular draft, I might add, has just reached us within the last few minutes. The Commission has not had a chance to examine this. I have not seen it before.

Representative HOLIFIELD. Wait just a moment now. Let us clear this matter up.

Mr. ALLARDICE. Mr. Strauss, this is the same draft we gave to Mr. Burrows either Thursday or Friday.

Mr. STRAUSS. Good. Then if there are any comments perhaps the General Manager will be prepared to comment on that draft.

Mr. FIELDS. As I have looked at this quickly, this eliminates the section which has any substitution in it; is that correct?

Representative HOLIFIELD. Yes.

Mr. FIELDS. That is the section of the proposed bill which causes us some concern.

Mr. STRAUSS. May I just interpolate right there, before the General Manager continues, that we could probably live with this limitation on substitutions if such a provision were restored with a limitation only with respect to the weapons and production divisions and even then only in circumstances where substitution is required by changes in weapons characteristics or weapons logistic systems. Those two things, we feel, are quite essential to our task, especially when Congress might be out of session and a change, a substitution, would be urgent and in the public interest.

Representative HOLIFIELD. I am going to have Mr. Allardice explain our approach to this problem and our division of these projects into two different categories and what we have sought to accomplish thereby and the reasons therefor.

Mr. ALLARDICE. This does not go to the substitution matter since that was excised during the markup session. But if you turn to page 4 of the draft bill under section 102, the limitations of the authorization are set forth. And 102 (a) limits your ability to start any project set forth in subsections 101 (a) through (d), which goes to pages 1 and 2 of the bill. If the currently estimated cost of that project is in excess of 25 percent of the estimate set forth, you would not be able to start it.

Mr. STRAUSS. Yes.

Mr. ALLARDICE. Subsection 102 (b) establishes a second category of projects, those listed between item (e) and item (j), in which case if the currently estimated cost exceeds 10 percent of that stated, you cannot go forward with the project. And then subsection (c) states that on a single project, that is 101 (k), the off-site roads, you can only go forward if the currently estimated cost is the same as that set forth in the bill.

The attempt was to work out with the Commission staff and ourselves, on the basis of the testimony and the justifications presented, those projects which seemed to be more closely known, more readily identifiable, the costs of which were easily obtainable. These we limited to 10 percent overrun. Those which had a broader spectrum of doubt were thrown into the 25 percent category, and the one that is obviously very straightforward, there was none.

Item (d) is a limitation on the general plant projects which follows the Commission's own internal criteria for such projects, that is, in community operations the maximum cost of any project taken out of these funds shall be $100,000, with a further limitation that any building in such a project shall not exceed 10,000; and secondly, for all other projects the maximum would be $500,000, and the maximum for any special building in the project, $100,000. And further, the

total cost of all the projects should not exceed by more than 10 percent that set forth under the item (1).

Mr. STRAUSS. Mr. Chairman, we believe we can live with these provisions. They are more restrictive than those under which we presently operate, but the General Manager's staff has reviewed them and feels we can operate under them.

Representative HOLIFIELD. Frankly we have felt that the Atomic Energy Commission is going to have to conform in the future much more closely to the regular procedures of other agencies before congressional committees than they have in the past, and it is felt there is a feeling among the Members of Congress that the time for flexibility has passed to a great extent and it has become now almost a normal procedure, and that in many ways you are going to have to conform in the future to a more rigidly planned schedule than you have in the past.

I am glad to hear you say that you feel you can live with this although it is more rigid than in the past.

Mr. STRAUSS. I would like to return, Mr. Chairman, with your permission, to the fact that the right of substitution has been excised and in that respect the Atomic Energy Commission is still quite different than most other Government departments—I started to say "all"—in that the art in respect of weapons design and production and weapons logistics is rapidly changing and has been rapidly changing ever since we entered the business. In those two circumstances, the Commission hopes that the right of substitution will be restored.

Representative DURHAM. Can you give us an example of that, Mr. Strauss, that might occur?

Mr. STRAUSS. I think that can be done, Mr. Durham.

(Discussion off the record.)

Mr. FIELDS. There are a number of specific examples which I will be glad to discuss off the record, Mr. Chairman. But perhaps I could outline in a general way, for the purposes of the record, the types of situations we often face.

You are well aware, I am sure, that the atomic energy program is in its infancy in terms of technology. We can never be sure when materials now of little significance may greatly increase in importance in a very short time. In the past we have experienced several of these sudden shifts in requirements, and for the most part they resulted from uncertainties in our weapons development program. Because of the urgency of the weapons program we must necessarily anticipate the requirements for new types of weapons while they are still very much in the development stage. To do this, we must rely upon the high skill and competence of the people in our weapons laboratories, and they have always justified our confidence in them. It frequently happens, however, that when we test new weapon types or principles either in Nevada or at the Pacific test site, we learn new and often unexpected facts which are in some cases signficant enough to warrant immediate incorporation in our weapons. It is this aspect of weapon tests that makes them so essential in our work.

The weapon tests recently completed in Nevada produced some vital clues of this type which we hope soon will be reflected in our production plants. Our problem is that we do not as yet know exactly how this change will be reflected. It may involve modification of some existing

plants or even the construction of new plant facilities. It will be some time before we know what changes will be necessary.

It is also quite possible that in the next few months as results of the recent weapon tests are evaluated, we may find a need for other changes in production requirements. We could not now guess what these changes might be, but on the basis of experience it seems to us that we should be ready and able to meet them. For this reason we believe it is essential that we be given the type of flexibility which this substitution language would provide.

Now, if I may, I should like to outline more specifically the problem we now face as a result of the recent tests.

(Discussion off the record.)

Representative DURHAM. Since you outlined that, what would it involve? It looks like you ought to be able to say it involves plant construction or new plant construction.

Mr. FIELDS. I expect it will not be massive construction or anything of the sort, but it could be fabrication facilities. I do not know. Perhaps several million dollars, something of this nature. Certainly not $10 million, I would not think, but something less than that. That is on one front.

Representative HOLIFIELD. You have got a cushion in their now of about 25 million.

Mr. FIELDS. I know we have certain cushions in there and if there is enough latitude in them to utilize those for that purpose we would.

(Discussion off the record.)

The problem we have is that when you design a plant that you are going to build with certain specifications on it and you put it in a data sheet, if we have to modify it slightly, do we or do we not have the flexibility to do it even though it is for the same purpose. And this is our problem really, do we or do we not have that latitude, to make such changes.

Representative HOLIFIELD. You would have in $25 million, would you not?

Mr. FIELDS. One of the reasons we can accept no substitution, I believe, in the reactor field is because of the $25 million project. It is a floating fund for the civilian reactor program. So you have flexibility there for the civilian reactor program in that fund. Specifically in the fabrication of weapons, you have a contingency fund of a sort there in the weapons program. But it does not necessarily apply in the division of production, is what I am referring to here.

(Discussion off the record.)

Mr. FIELDS. So we felt that, in certain areas only, where a change is required in the weapons characteristics or in the production, storage, logistic systems, if we had some flexibility just in that area, then we could go forward feeling that there would be nothing in the production of weapons that would be hampered.

We would suggest substitution in only two areas, therefore, and the latitude to use it for those sorts of purposes.

What it would entail, I would suggest, is that—I do not know whether you have a copy of the proposed substitution language before you or not.

Representative HOLIFIELD. We have 101 (e).

Mr. FIELDS. The section was 106.

Representative HOLIFIELD. We have it.

Representative DURHAM. Let me ask a question right at that point. Do you anticipate that substitution would come about by having at the present time not evaluated fully the tests which were run this year, because we run no more tests until next year or sometime later. Does it stem from that or some other military objective?

Mr. FIELDS. It will stem either from those tests, Mr. Durham, or from the present studies of our production chain. This we are studying at the present time but we have not firmed up on our plans as yet.

Mr. STRAUSS. Dr. von Neumann had a comment here.

Representative DURHAM. That would also hold true on weapons, would it not, from now on out, because you do not expect to become static.

Mr. FIELDS. One of the reasons this is coming up right at this time is that we are reexamining our production operations.

(Discussion off the record.)

Representative DURHAM. I am trying to see the difference between weapons development over the past years. Of course, we have never carried any such substitution in the military budget or authorization. We have always specifically authorized this or that. And, of course, there have been wide variations and we have never had any difficulty in meeting the situation on those things as far as I know.

Representative HOLIFIELD. Will the gentleman yield?

Representative DURHAM. Yes.

Representative HOLIFIELD. Is it not true that in section 103 you are given the right for all your advance planning, your construction design, and your architectural services in connection with projects which are not authorized by law? Would that language not give you the leeway with your $20 million to do that which you would want to do before you could come before us with—would not the period of time when Congress is not in session give you the latitude to do what you want to and then come back to Congress when it is in session for a supplemental or emergency appropriation if you needed it?

Mr. FIELDS. It may well provide us with the flexibility, sir. I just do not know. These things come up so rapidly and overnight.

Representative HOLIFIELD. You cannot go——

Mr. FIELDS. I am not talking about a very large reorientation of the program, sir.

Representative HOLIFIELD. If you are not talking about that, would not the 20 million give you flexibility?

Mr. FIELDS. It will, provided we have not used it up.

If I could give you the language maybe it would not disturb you so much.

Representative HOLIFIELD. Is it different language from what we already had?

Mr. FIELDS. Yes.

Mr. STRAUSS. Before the General Manager reads this, Commissioner von Neumann apparently has a comment he would like to make.

(Discussion off the record.)

Representative HOLIFIELD. Let us hear the language.

Mr. FIELDS. Section 106 with just an insert in it. Perhaps I should read it.

No funds authorized to be appropriated or otherwise made available by this act shall be used to start any new project for which an estimate was not included in

this act unless it be a substitute for a project authorized in subsection 101 (a), 101 (d)—

and then I would cross out 101 (e) or 101 (f). Now here is the insert:

as required by changes in weapon characteristics or weapon logistic operations—

and then it continues.

Representative HOLIFIELD. Give us that slowly so we can copy it.

Mr. FIELDS (reading):

As required by changes in weapon characteristics or weapon logistic operations and the estimated cost thereof is within the limit of cost of the project for which substitution is to be made and the Commission certifies—

and it carries on.

Representative HOLIFIELD. Still as it is here?

Mr. FIELDS. Yes, sir.

That would permit flexibility for the sort of things we have been discussing.

We have not had experience with the new method of authorization either. It may well be that it will work out very satisfactorily without any substitution provision but we felt we should call this concern to the committee's attention.

Representative COLE. Let me ask Mr. Fields, if the language proposed for section 106 is now carried in any legislation or appropriation affecting the Commission?

Mr. FIELDS. Not that I know of except in our appropriation last year. We did have substitution authority last year. As a matter of fact, we had broader substitution last year than this.

Representative COLE. Is that authority expressed in this fashion in a negative sort of way?

Mr. FIELDS. It is expressed in a negative sort of way, yes, sir. Is that not correct, Mr. Burrows?

Mr. BURROWS. Yes.

Mr. FIELDS. But it applies to all of the plant and equipment items.

Representative COLE. It is questionable in my mind whether this negative method of expressing an effort to grant authority for appropriation is sufficient to constitute a grant of authority to appropriate money. It would seem to me it might better be expressed in an affirmative way by saying:

Funds authorized to be appropriated may be used to start other new projects if those other new projects are a substitute in the field of weapon change and are due to weapon changes.

Mr. FIELDS. That would be preferable, I believe, Mr. Cole.

Representative HOLIFIELD. Your thought would be to apply that to 101 (e) only and then allow the language to stand on 101 (a), 101 (d), and 101 (f) substantially, and have another section put in, possibly?

Representative COLE. My comment went to the reverse English that is used in expressing the goal that is sought to be accomplished, where you say:

No funds authorized to be appropriated by this act may be used for any other project unless it is a substitute.

I think it better to say affirmatively that funds are authorized to be appropriated for any new project if it is a substitute for a project that is carried in this act, and if it is in the weapon change field and if the Commission certifies.

Mr. FIELDS. Yes, sir. I think that would be better language.

I think it should apply to 101 (a), (d), and (f), and eliminate (e) from the bill completely.

Representative COLE. Do you see what I have in mind?

Representative HOLIFIELD. Yes, I understand.

Representative COLE. Eliminate the word "no," and start:

Funds authorized to be appropriated or otherwise made available by this act may be used to start any other new project for which an estimate is not included in this act if it is a substitute for a project authorized in subsection 101 (a), 101 (d), 101 (f), and is required by changes in the weapon characteristics and that the estimated cost——

Mr. FIELDS. Yes, sir.

Representative COLE. Then that is a positive authorization.

Mr. FIELDS. That is a positive authorization.

Representative COLE. For the Commission to make substitution in those particular areas when circumstances justify because of weapon changes and weapon characteristics and logistics.

Mr. FIELDS. Yes.

Representative DURHAM. Under the present law, would you have to report to this committee before the substitute was final?

Mr. FIELDS. Under this language we would not. I do not believe we would have any difficulty with the requirement to do that but I am under the impression that perhaps the committee feels it is not appropriate language.

Representative COLE. You would have an obligation to advise this committee of any change.

Mr. FIELDS. Yes, sir, an obligation.

Representative COLE. Not by virtue of section 106, however, because——

Mr. STRAUSS. Under the "fully and currently informed."

Mr. FIELDS. Yes.

Representative HOLIFIELD. I think Carl is referring to the clause in the military bill.

Representative DURHAM. Yes.

Representative HOLIFIELD. Which Mr. Kilday and I both have objected to in the past on constitutional grounds, that is, report to us for concurrence.

Representative COLE. It is not involved in this bill.

Representative DURHAM. No. I have just asked, would they have to report to us under the language in the original act.

Representative HOLIFIELD. There is no doubt that we can arrive at language to do it. It is a question that the subcommittee will have to decide as to whether they want to. Are there any further questions on that point? We can pass it at this time for executive consideration.

Mr. HAMILTON. It is true, without the substitution language there is less flexibility to use Government funds, but in the past there was no private industry licensed to which the Commission could turn and from which it could procure on a unit basis things like plutonium or any other product. I wonder if the existence of an industry to which you might turn does not give the Commission a degree of freedom to obtain emergency items probably just as fast as it could if it got them by its own plant.

Mr. STRAUSS. How would we reimburse them?

Mr. HAMILTON. Out of the operating budget which does not require authorization.

Mr. STRAUSS. The operating budget is pretty well dedicated to certain projects. I think this suggestion would, in the end, give rise to more justified criticism by your committee of the action of the Commission than almost anything I could think of.

Representative HOLIFIELD. It would involve actually the subsidization of construction because of a high price for some material if that idea was carried out, would it not? Let us say you want another Savannah River plant, you want the product of that plant. If Mr. Hamilton's suggestion was followed, it would mean you would go to private industry and contract with them at a price per unit which would justify them building and producing. That is what it would mean.

Mr. STRAUSS. I do not see, for example, how that would apply to the logistic problem. If it was a matter of storage sites or something of that sort, there would be no income to the bidder.

Mr. HAMILTON. It might not go to that but it would go to something like plutonium or U–233 or a fabrication plant.

Mr. STRAUSS. I would say, Mr. Chairman, without having had the benefit of discussing it with my colleagues, that it would be an expedient which we would be reluctant to be forced to. We might have to do it in the public interest, but we would hate to have to do it.

Mr. LIBBY. I would think that production of reactor products might be one of those sources of profit which might help to make atomic power economic, but I do not think it could fill the emergency gap which you have been discussing here.

Representative HOLIFIELD. For weapon purposes.

Mr. LIBBY. I doubt it.

Representative HOLIFIELD. Any further questions on this point? Mr. Allardice.

Mr. ALLARDICE. It is understood that if you did have the substitution language, a limit of funds available for use under such a project would be those funds made available for appropriation under this act, is that correct?

Mr. FIELDS. That is right, yes.

Mr. STRAUSS. No new money.

Mr. ALLARDICE. How about the money you may have available in savings or such in previous years. Would that apply to a substitution project or not?

Mr. BURROWS. The way this language is stated, the project which is substituted could not exceed in amount the old project. Therefore, you would have the money that you save from the project for which you made substitution. Now to the degree to which you had an overrun permitted by the act, you might use prior-year money.

Mr. ALLARDICE. But the limitation on making available prior-year money would be the overrun provision?

Mr. BURROWS. Yes.

Mr. ALLARDICE. Could you lump together 2 or 3 projects and substitute 1 or 2 or 3 under that language?

Mr. BURROWS. That I am not prepared to answer definitely. We used to have such authority. But when you speak of a project for a project, the way this language now reads, it does not seem as though you would have that authority.

Mr. ALLARDICE. Under the present limitation in the 1955 Appropriations Act, are you free to substitute one project for 4 or 5?

Mr. BURROWS. No; but I would like to be checked by the General Counsel on this. I believe we are permitted, however, to make more than one project out of an old project.

Mr. MITCHELL. Yes.

Mr. ALLARDICE. But not take 4 or 5 old ones and make them into 1 new one?

Mr. MITCHELL. I would think not.

Mr. BURROWS. That is my understanding.

Representative COLE. What is the reasoning there?

Representative HOLIFIELD. The language—"substitute for a project."

Mr. MITCHELL. That is it, sir. We are substituting a project.

Mr. FIELDS. In this language.

Mr. STRAUSS. We are making legislative history at this juncture which may very seriously clip our wings in the future unless you are sure of that.

Mr. ALLARDICE. The Appropriation Act, Public Law 428, reads:

Provided further, That no part of this appropriation shall be used (a), to start any new construction project for which an estimate was not included in the budget for the current fiscal year unless it be a substitute therefor within the limits of costs included in the budget.

Actually we used this as a matrix on which to build 106 when we started.

Representative HOLIFIELD. Both seem to refer to singular projects. It would work both ways it seems to me.

Representative COLE. I have been told by the experts that the construction of legislative language authorizes you to substitute the plural when circumstances justify it in place of the singular expression used in the law. So although the law may say, "substitute for a project," to the extent that can be justified to substitute a single project for other projects you would have authority to do it.

Mr. ALLARDICE. The reason I asked, Mr. Cole, is when you restate this in the positive, as you did, I think it may be argued that it does allow you to use any funds you may be able to substitute. I do not know. Because it now reads:

SEC. 106. Any funds authorized to be appropriated or otherwise made available by this Act may be used to start any other new project for which an estimate was not included in this Act if it be a substitute for a project authorized in subsection 101 (a), 101 (d), or 101 (f).

The only ambiguity is this article which modifies the word "project." The first sentence, "any fund," is pretty broad. Then you limit it for a project. I was trying to get clear in my mind just what it meant.

Mr. MITCHELL. I think, as the chairman suggests, we have not given this thorough consideration and I hesitate to give an unequivocal answer on it.

Representative HOLIFIELD. Maybe we can pass the exact language at this time with the understanding there will be a conference between General Counsel and the staff. First we want to get the words exact and then the subcommittee will decide whether it wants to do it or not. But let us have some exact words to consider before we adopt policy.

All right, if there are no other questions and no other comments on the part of the Commission as to the—I assume you are in favor of 103 and 104 and 105, those sections, that there is no comment on those?

Mr. FIELDS. That is correct.

Representative HOLIFIELD. Let us get then to Merchant Ship Reactor Project 56–B–11, section 101 (b) 11, $21 million. We would like to have from the Commission this morning such information as you have on this—what your plans are, where you expect to get your money, and what action has already been authorized on this, and any other pertinent information you think the subcommittee should have.

Senator Millikin, we have had previous discussion on this. So if you want to ask any questions be sure to do so.

Senator MILLIKIN. Thank you very much, Mr. Chairman.

(Discussion off the record.)

Mr. FIELDS. With respect to the merchant ship reactor, we requested authorization in conjunction with this bill in the amount of $21 million, and that is what we would propose as the source of funds by appropriation, following an authorization by this committee for that part of it. Our estimate still stands for that part and involves the construction in a ship of the STR-type of reactor. We would still estimate that there would be involved something like $3½ million out of the operating program for the core fabrication. This would have to be taken from money made available in the operating appropriation.

Representative DURHAM. Have you started the core?

Mr. FIELDS. No, sir. We did start it but we stopped it after the subsequent hearing before this committee. Now I found subsequently that there was some work going on towards acquisition of some zirconium for the core. That work has also been stopped. I am assured by the staff that it is stopped "as cold as a cucumber" at this point.

There are some discussions going on with Westinghouse and some of the contractors. There is no actual work in getting ready. In addition, we are working with the Maritime Administration on how to get on with the project, and they are coming before the Commission tomorrow to lay before it plans for four alternate types of ship hulls that might be used, with the intention that when we reach agreement, Mr. Strauss would then take to the President our recommendation for the selection of the hull.

Representative COLE. Where are the funds for the construction of the hull, which amount to 12 million, to be authorized?

Mr. FIELDS. It is my understanding they would be authorized under the Maritime Administration appropriation. We are not requesting any money for that. I believe the President authorized it the other day.

Representative PRICE. The President requested $11½ million in a special message.

Mr. FIELDS. Yes.

Mr. LIBBY. Was it not $12½?

Representative PRICE. $12½. That is correct.

Mr. FIELDS. $12½, I believe.

Representative HOLIFIELD. And that request would go to the merchant marine committee, would it?

Mr. HAMILTON. It has gone to them.

Representative PRICE. For authorization, yes.

Mr. FIELDS. For authorization, yes.

Representative HOLIFIELD. Any questions, Mr. Cole?

Representative COLE. Does the Commission have anything further to add with respect to the nature of this project, what it will do, what sort of function, or how it will go about selling to the seaboard population of the world the possible peacetime uses of the atom? Do you have anything further to add by way of description of the project than what was done at the first meeting a month ago?

Mr. STRAUSS. Mr. Cole, if I might reply to that, I should like to say that while I was abroad I saw the statements that had been made and my feeling was that, for a project which will take as long to complete as this one necessarily will, operating under a full head of steam, it is premature to say precisely what kind of cargo this ship will transport. But I think the project of having a nuclear-powered surfact vessel on the ocean at the earliest possible date and before either the British or any one of the Scandinavian countries or the Russians have it, is an important and appealing one. I believe that your committee, if such a vessel put into one of our eastern harbors under the flag of some other nation prior to the initiation of such a project by us, would be properly critical of the enterprise of the Atomic Energy Commission.

We have rumors, unsubstantiated, to the effect that the Norwegians are engaged in such a project, even that they have approached the British to build the ship. We do not know that there is any substantiation for these rumors.

The French have made a similar—a similar statement has emanated from France. I cannot characterize it as official because I have not seen it in that form. But the fact it is a feasible thing, and whether or not it is economical, it is one that we cannot overlook.

Representative DURHAM. In your talks over there just recently, I suppose you have been in contact with some people with some authority or know-how. In your opinion, do you believe they can do it in 4, 5 years, 2 years?

Mr. STRAUSS. I believe if the British set out to do it, they could do it almost as quickly as we could. I say if they set out to do it, with a very big "if." They have not anything like the amount of money to spend that we have, Mr. Durham, and they are spending it very economically. Their principal aim today is to produce electrical energy for home consumption. Their whole project is largely oriented to that.

Representative HOLIFIELD. Admiral, you were not here when we had our first meeting on this, possibly the second meeting on this, and there is a great deal of doubt in the minds of some of us as to the wisdom of this whole project. Frankly it is a propaganda move and we feel that it would cost around 35 to possibly 45 million dollars before you are through with it. From a propaganda standpoint some of us feel that there are a great many things that can be done at a great deal less cost which will have more of a propaganda impact than a smokeless merchant marine ship which will cost such a fantastic sum and which will not add anything in the way of fundamental technological advancement in view of the fact that it would be an adaptation of the *Nautilus* engine. And we have had the staff pre-

pare some information here which I would like to put on the table at this time.

The medical therapy reactor to be built at Brookhaven for which authorization is being requested costs approximately $765,000. Ten such machines could be built in the 10 leading medical centers in the free world for $7,650,000. This would be just about 20 percent of the cost of the proposed merchant ship.

Ten machines to bring atomic aid to the world's sufferers from cancer could be bought for only one-fifth the cost of the merchant ship.

The authorization request before us asks for $500,000 to build a swimming pool type research reactor in the Philippines. This machine is proposed as the "heart" of nuclear development for the Philippines.

Twenty such research reactors could be built in 20 major universities in the free world at a cost of only one-third (35 percent) of the cost of the President's merchant ship proposal.

The authorization request from the Commission asks for funds to build an international training center at Argonne where foreign students can be trained in modern nuclear technology. Testimony before the committee was that the cost per student for such training will amount to $2,500 each.

Four thousand foreign students could be trained in nuclear technology at a cost of only one-third of that for building the atomic-powered merchant ship.

Mr. STRAUSS. I would like to comment on that. If these things were mutually exclusive there would be no answer to that argument. But the same argument could be made to compare the cost of this with the cost, let us say, of a cruiser or something of the sort. Now the fact——

Representative HOLIFIELD. Not exactly, now. If we are going to build a warship, then other factors enter into it, a cruiser or a carrier, which we are committed to do. We are going to build that ostensibly for military reasons, and if we do go into the $25 million surface ship type of construction we are going to build, as I understand it, several reactors attached tandem-fashion to the propeller shaft, any one of which could be utilized singly as a merchant ship propelling unit. So some of us feel like that while there might be some justification for going into that from a military standpoint, that you could achieve the merchant ship results concurrently with the development of a series of reactors for the military ship, and that you would be achieving technological advance in that instance, where you have the very minimum of advancement in the adaptation of the *Nautilus* engine, just making it a little larger in comparison with this other procedure.

Mr. STRAUSS. There is no doubt of the fact that if more time were taken and a completely new design adopted that the opportunities for technological advances would be greater. The obvious disadvantages in risking second or third place in this kind of development in the world at large is important from a military standpoint as well as a propaganda standpoint.

Representative HOLIFIELD. Of course, this argument could be made for anything in the world that you want to do that mind of man can conceive, that if we do not hurry up and do it somebody else is going to do it.

As long as we are discussing some of these things that could be done at less cost and in my opinion with a great deal more propaganda value, we might as well go ahead and say—

A duplicate of the PWR would be $5 million cheaper than the President's atomic-powered merchant ship.

The Army packaged powerplant is being built on a unit price contract by the American Locomotive Co. at a total cost to the American taxpayers of $2,096,000. Sixteen such units producing 2,500 kilowatts of electricity each could be built in 16 separate parts of the free world for the same cost as that indicated for the President's atomic-powered merchant ship.

The entire Federal investment in facilities at Bettis Laboratory, which is the world's largest going organization for the development and engineering of nuclear power plants is less than the $35 million requested for the merchant ship.

The entire investment of the American taxpayers in the Argonne National Laboratory, our largest basic nuclear laboratory—including its three research reactors and its extensive critical facilities—is only twice the cost of the President's merchant ship.

The water boiler research reactor dedicated on the campus of North Carolina State University on Sunday, May 22, costs all told $630,000. Twenty such machines could be placed in research centers and on university campuses throughout the free world for only $13,500,000, about a third of the cost of the President's proposed merchant ship.

If we are looking for real public relations and looking for something that is to be permanently situated, why could we not do something like this in many countries and there would be a permanent monument of United States aid, and not only of aid but of access, such as the Philippine reactor will be, for further research of all of the people in that country.

Mr. STRAUSS. I think such projects are good but I raise the question, Mr. Chairman, as to whether they are mutually exclusive, whether some of these things cannot be done as well as the development and production of this ship.

Representative HOLIFIELD. Of course, if the pocket is bottomless and its capacity is unlimited we do not have to consider certainly the theory of economics at all.

Any questions, Mr. Durham, on this?

Representative DURHAM. The thing that worries me, Mr. Chairman, is the fact as to whether or not this is the type of reactor adaptable to a merchant ship. I am not convinced the thing is at all feasible to run a merchant ship. I feel like we should get along with this propulsion for ships as fast as we can, but I want to go at it in a sensible way, and not build something here that would not run or might turn the ship over some day. No engineer I know and the best information we have had here—nobody has convinced me that the thing is feasible at all.

Mr. STRAUSS. Mr. Durham, I have not heard an argument against its feasibility. The others that have been put forward I have heard. No one, as far as I know, who is qualified to pass upon it technically, has said that it is infeasible.

Representative DURHAM. Let me ask you this question, if you are an engineer—of course you are not.

Mr. STRAUSS. No.

Representative DURHAM. You would not design an enormous reactor to go in a merchant ship if you were an engineer.

Mr. STRAUSS. I think we are at the buggy stage in shipbuilding. No one would have designed the kind of an engine that went into the *Claremont* to propel a steam vessel in the Hudson River, but the first one had to be built. You are probably familiar with the history of that enterprise. It was generally laughed at and scorned because it was said no steam-propelled ship could ever carry enough fuel to get it across the Atlantic. There is little doubt that our supremacy on the seas has been due to our pioneering in shipbuilding, both the clippers and the subsequent steam-driven merchant ships we put on the seas in the early part of the last century.

Representative DURHAM. Pioneering I believe in, but I believe in designing a reactor that will run a merchant ship; and I believe most anybody knows there is a difference in running a submarine and a merchant ship. I have had a little experience on the water.

Representative HOLIFIELD. The cost of operating this ship is going to be probably 108 times as high as an ordinary ship, maybe 208 times. I do not know.

Mr. STRAUSS. It will be higher. I do not know what the factor is.

Representative HOLIFIELD. Of course that will be a factor of expense to the Government. You are spending here a third of your capital investment that was supposed to be saved by the Dixon and Yates budget item of $105 million.

Mr. STRAUSS. I do not think they are comparable at all.

Representative HOLIFIELD. I am speaking now from a budgetary standpoint. Why are they not comparable? When you did not want to add that amount to the budget that was one of the main excuses for going the other way, and now you are wanting to add in the neighborhood of 35 to 45 million, according to whether you have geared to turbo-electric or just for regular propulsion.

Mr. STRAUSS. I should not be in the position of defending the economics of this budgetwise. That is, the President has asked for that. He has weighed, and is in a position to weigh, all of the demands upon the administration for the revenues of the country. My comment is directed solely to its feasibility, its point of competition with possible similar enterprises from other parts of the world, and its usefulness to us in providing experience upon which to build a nuclear-powered merchant marine and perhaps Navy.

Representative HOLIFIELD. Of course, one of the things that bothers this committee was that the Maritime Commission knew nothing about it, the Atomic Energy Commission knew nothing about it. It came out of the blue.

Mr. STRAUSS. I cannot speak for the Maritime Commission, Mr. Chairman. With respect to the Atomic Energy Commission, there was an inordinate circumstance. This paper which came from the National Security Council was sent by me to the General Manager 5 days after its receipt for distribution to the Commission and through some oversight it did not reach the Commissioners as promptly as it might have. But I am sorry that you make a point of that.

Representative HOLIFIELD. Why are you sorry, sir? The testimony before our committee was that they—I think Dr. Libby gave the testimony that he had only received it a very short number of days before it was announced publicly. Am I in error in that, Dr. Libby?

Dr. LIBBY. Two or three weeks, it may have been.

Representative HOLIFIELD. It was not a matter of consultation with you but a matter of informing the Commission as to an action of the Security Council. It was not a matter of bringing up a matter after consultation, but a matter of informing you, was it not?

Dr. LIBBY. I do not think I testified on that point, Mr. Holifield, but——

Representative HOLIFIELD. No; you did not make that statement. That was my statement of an interpretation of what had occurred and I believe my interpretation is correct. If it is not, I would like to be disabused.

Dr. LIBBY. I believe my testimony was to this sense: It essentially was the President's idea.

Representative HOLIFIELD. That is right.

Dr. LIBBY. But I strongly approved of it and wanted to do everything I could to get along with it. I believe that was the sense of my testimony. Of course it was a couple of hours long.

Representative HOLIFIELD. I certainly think you approved of it, but that was not the point that I was bringing up.

Mr. STRAUSS. Mr. Chairman, was the point that you were bringing up any implied criticism of my function of having advised the Commission?

Representative HOLIFIELD. No, sir, I did not even know you had been informed, sir.

Mr. STRAUSS. I have a chronology here which has been prepared by the staff and from which I would like to read a few excerpts.

Representative HOLIFIELD. Surely. We would like to have the record straight.

Mr. STRAUSS. The Commission had a paper dealing with United States policy on atomic power in other countries. This later appeared in a somewhat revised form as a Security Council document. One recommendation of the latter document called for a study of the cost and time required to install a nuclear propulsion unit in a United States merchant ship at the earliest possible date. The ship would travel to the nations of the free world to demonstrate our efforts and progress in developing peaceful uses of atomic energy.

Representative DURHAM. What date is that?

Mr. STRAUSS. That appears to have been approved on March 12.

Representative COLE. By whom.

Mr. STRAUSS. By the NSC, and subsequently the President.

Representative COLE. What was the date of the Commission paper?

Mr. STRAUSS. I do not have that, but some weeks or months prior to that.

On March the 12th, as I say, it was approved, and ordinarily some days following its approval I receive from the Security Council's Executive Director a paper so informing me. On March 18—and there may have been a weekend intervening, I do not know, but in any event there are only 6 days—I sent it to the General Manager for circulation to the Commissioners and to the members of the staff concerned therewith, and attention was particularly invited to the paragraph I have just quoted.

Now it is true that I might follow each of my memoranda around to see whether necessary things are complied with. This is the first

instance that I know of where an inadvertence in the office of the General Manager meant that such a paper was not circulated.

Representative HOLIFIELD. The record shows this was while General Nichols was General Manager?

Mr. STRAUSS. That is right, and he was preparing to leave and it is quite possible this may have occurred in that interregnum. But on March 25, in a Commission meeting attended by all the Commissioners, the record shows that I stated that the Security Council was very keen about our going ahead with the installation of our reactor on board a merchant ship, and that was 7 days later than the date I sent the memorandum to the General Manager.

That was a matter of record and is in the transcript in the minutes.

On the following day I was requested by the Security Council to make an early written report on the project. On March 29 a memorandum was prepared for my signature to the other members of the Commission and the General Manager, informing them of the required report on the merchant ship installation and requesting that the General Manager have the staff prepare the report and make simultaneous distribution of it to all the Commissioners. They all received that.

Before I could sign the memorandum I left town and did not return until the evening of April 1. However, at my request a copy of the memorandum with my signature typed in was delivered. In discussion with me as to the date the report would be made to the Security Council, April 14 was selected. No meeting of the Security Council was to be held on that date and in view of the fact that I had planned to be away between the period April 19 and May 20, the Security Council agreed to hear the report on April 7. Since there was no opportunity of a meeting with the Commission, I presented the report with the statement that it was my own personal view in which no Commission concurrence had been received.

Representative COLE. What was the report—a staff report?

Mr. STRAUSS. The report prepared by staff.

The Commission, however, considered and approved the report that had been made by me to the NSC on April 7. Commissioner Murray abstained from voting.

That is the tale of circumstance of that event.

Representative DURHAM. The request came directly from the President through the Security Council in the beginning.

Mr. STRAUSS. The request came to me direct from the Security Council. I do not know precisely how it originated in the Council.

Representative DURHAM. The language in the paragraph you read there, the Security Council, I would assume it was language from the President.

Mr. STRAUSS. That, Mr. Durham, is an action of the Security Council which the President approved. So upon his approval it becomes his directive. That is the form in which the Security Council operates. The Security Council has no authority as such.

Representative DURHAM. I know that, but I just wonder whether it originated in the Security Council as a whole or the President.

Mr. STRAUSS. In the Security Council.

Representative HOLIFIELD. Of course, without any comment at all upon the chronology, the only point I made in my remark was that apparently this decision was taken by the President without consulta-

tion with those departments of the Government which are most concerned, such as the Maritime Commission in building the hull, and the Atomic Energy Commission in regard to the reactor and utilization of material.

Mr. STRAUSS. Mr. Chairman, I thought you said without the knowledge of the Commission.

Representative HOLIFIELD. The knowledge of the Commission was obtained only very shortly before the public announcement, and consultation as to the wisdom of it apparently was never taken up as a matter of Commission decision.

Mr. STRAUSS. Mr. Chairman, the record shows that the Commission had knowledge of it as early as March 25, if not earlier. There was no public announcement, I believe, until the end of April or early in May. I was away, and I do not know the date, but it was either toward the end of April or early in May.

Representative HOLIFIELD. Are there any further questions on this?

Representative COLE. Mr. Chairman, 10 days or 2 weeks ago, and after the hearings on this subject by the subcommittee, having expressed myself at those hearings as somewhat critical of the peace-ship project, I wrote a letter to the President making a suggestion of a revision of his thought with respect to an atomic ship, and I understand that letter has been transmitted by him to the Commission, and was advised that the suggestion would be considered by the Commission. I judge from the silence of the spokesmen of the Commission that the Commissioners do not feel too approvingly of that idea.

Mr. STRAUSS. No, Mr. Cole, he did not transmit the letter to the Commission. The President transmitted the letter to Mr. Rockefeller, that is my belief. I have seen a copy of it but it has not been referred to the Commission.

Representative HOLIFIELD. We can only judge——

Mr. STRAUSS. Just a moment. I may have given you some incorrect information. Mr. Chairman, the Commission may have received this letter formally, but not from the President. I will have to give you further information, Mr. Cole.

Representative COLE. I am not too concerned of how the Commission got it. I am more concerned by the fact apparently the Commission had before it the suggestion and obviously does not think well of it.

Mr. STRAUSS. No, I believe that you are going too far in that assumption, Mr. Cole.

Representative COLE. That was why I made the suggestion an open invitation to the Commission to give any further justification it might have in support of this peace ship idea, and nothing new has been forthcoming so I assumed that the Commission had considered the suggestion and had not accepted it.

Mr. FIELDS. I think we have received such a letter. I do not believe we have commented on it yet. I am not aware of it anyhow.

Representative COLE. I think we are all in support of the general objective of what we might characterize the President's ship proposal. I think it is important that we display to the world our continued leadership in the field of atomic energy and do what we can to show the people of the world the beneficial aspects of this force, but simply taking an atomic reactor out of an existing ship which has proven that we can push a ship under the water—and most certainly we can push

it on the surface of the water—and putting that type of reactor into a conventional merchant ship, to me just does not prove anything that is not already known and is not a dynamic, a creative, a productive, a positive sort of demonstration which I would like this ship to demonstrate.

Mr. STRAUSS. As I understand it, your proposal, Mr. Cole, is not excluded by the type of construction.

Representative COLE. Most certainly we are not going to do both of them. I do not see why we should do both. Which brings up another question I would like to inquire——

Senator MILLIKIN. What did you say there?

Representative COLE. I would not be in support of doing both projects, building both ships.

Representative HOLIFIELD. I think maybe, Mr. Cole, you should explain at this time, so Senator Millikin can know, what your suggestion was for modification of this proposal. I believe he would like to know it.

Representative COLE. Well, it isn't exactly my idea but a combination of thoughts that have been conveyed to me by various persons who are interested in the general problem.

Soon after that public hearing, I was visited by a very energetic lady who is interested in American enterprise and American international relationships. She, for the last 6 months, has been working on the idea of this Government building or using one of our old wartime merchant ships as sort of an industrial world's fair. The ship would be equipped with various types of American manufactures, perhaps exhibits showing types of model average homes, the average American farm, the type of equipment it has. The manufacturers of those items would provide the personnel to accompany the ship, perhaps pay some cost for this form of advertising. The ship would go to various parts of the world to show people of the world what sort of products we make here.

So it occurred to me that it might be feasible and perhaps accomplish more effectively the purpose the President had in mind if we could reconvert one of our baby flattop aircraft carriers that was used during the war, started originally as a tanker and converted to a small flattop convoy of merchant vessels, to put into that type of ship one of the *Nautilus* reactors, include a generator, propel the ship by electricity made from atomic energy, install in the ship these exhibits of American manufacturers. The ship, as you know, because of its storage space for airplanes has large bays for display and demonstration. It would have this flattop deck for display of the wares when the ship was in port. Because of the fact that electricity could be generated by the atomic reactor, the ship could plug into the current system of the city, the port, which it was visiting. It could be publicized that the lights which were being used to light the homes of the people in Hong Kong or Singapore or wherever it might be or to run the streetcars, was electricity made from atomic energy. The people would be invited to come aboard and see these things which in themselves are the product of atomic energy, production of manufacturers, which to me is the beneficial use of atomic energy.

Then to have these illustrations of isotopes and pictures of industrial uses of isotopes, the other applications, indirect, secondary applications of atomic energy, could also be shown. That, to me, is some-

thing creative, constructive and opens one's eyes when you see what can be done.

But just to see a ship being pushed on the surface of the water by an atomic reactor which is an outmoded type of reactor already—yes, it will prove that we can push a ship by atomic power but we know that already and the people of the world have been told that already. That, I think, would have some merit.

And I have inquired as to the cost. I am told it is not only feasible but practical to use one of the these flattops which is now tied up in mothballs someplace at one of the ports; the *Nautilus* reactor can be put into it; it can be adapted to generate electricity; the ship can be propelled with the electricity made from the atomic energy reactor and the electricity generated can be projected into the electric grid of any port that is visited; the ship can be made air conditioned, can be equipped ready to receive these exhibits for approximately what the peace ship is to cost—between 30 and 35 million dollars.

I might further say this lady who told me of her efforts to arouse interest in a floating industrial world's fair has reported to me there was considerable enthusiastic approval of the idea in the Department of Commerce. I have not verified that. I do not know. But it is true that the Commerce people, whose responsibility it is to develop American commerce locally as well as abroad, if they are receptive to the idea of a floating industrial world's fair, then why not combine the two of them?

I still am not too enthusiastic about the President's conception of an atomic ship. I do not want to be unfair to the President because it may not be his conception, but the project which has come to be known as the President's conception.

I know that he is extremely enthusiastic about having a ship floating that is propelled by atomic energy to visit the various places in the world to show the people that this thing before us can be used for nonmilitary uses. So I think we have a chance to not only show that but also show these other things that are the consequences of atomic energy.

I did want to ask Mr. Strauss: You have said that your staff paper, in paragraph 28, the date of which I do not recall——

Mr. STRAUSS. That paragraph was not in the staff paper.

Representative COLE. Well, the Commission paper.

Mr. STRAUSS. It was not in either the Commission paper or the staff paper. It was in the NSC paper.

Representative COLE. No, no. Perhaps my understanding of your testimony was in error, but you identified a document as AEC number something slant number something.

Mr. STRAUSS. That is right.

Representative COLE. Did not the NSC document refer to some paragraph in the Commission's document with respect to the need for early action in atomic surface ships?

Mr. STRAUSS. I cannot recall, Mr. Cole. I do not believe it did but it may have.

Representative COLE. Why do you refer to the Commission document?

Mr. STRAUSS. I refer to the Commission document because that was the document which initiated the action by the NSC on the

NSC paper, which was not limited to the ship but covered a rather wide spectrum of atomic development abroad.

Representative COLE. What was there in the Commission document which prompted the NSC to concentrate its attention on this surface ship?

Mr. STRAUSS. It did not concentrate its attention on it. The NSC paper, as I said, covered a fairly wide spectrum of the peaceful uses of atomic energy abroad.

Mr. MURRAY. There was not one mention in that Commission paper of a merchant ship, Mr. Cole.

Representative COLE. I do not understand then why, Mr. Strauss, you referred to the Commission paper in connection with this subject of an atomic ship.

Mr. STRAUSS. I am sorry. This was the origin of the NSC action.

Representative COLE. Yet you say the Commission document makes no reference to that ship.

Mr. STRAUSS. No mention that I can recall and Mr. Murray just confirmed it.

Representative COLE. Then I find it difficult to understand how it has come about that the Commission now is so anxious for development and progress in proving out surface ship propulsion when, as I understand to be the fact, the Maritime Administration requested funds for this very purpose for fiscal year 1956, and it was denied by the Budget on representation from the Commission.

Mr. STRAUSS. I would be surprised if any representation from the Commission resulted in a denial of funds to the Maritime Administration. I cannot make that statement positively, Mr. Cole, but I do not believe it to be a fact.

Representative COLE. Well, it is a fact that the Maritime Administration did request funds of the Budget Bureau for this very type of project and the funds were denied by the Budget Bureau.

Mr. STRAUSS. I know that we have been discussing with the Maritime Administration a merchant type atomic powered hull, commencing with an approach made by the Maritime Administration nearly a year ago, early last fall. So it would hardly seem likely that we would have given an adverse recommendation on any request for funds that they might have made. Nor do I recall any such letter or hearing.

Mr. HAMILTON. The Maritime Administration proposal was for a semisubmersible petroleum cargo ship to be driven by water jet propulsion. It was apparently informal. Advice was sought by the Budget Bureau from people who were supposed to be expert in reactor engineering, we understood, within the Commission, as to the current feasibility of the entire concept, and they were told it looked as though it was a little bit early to be starting something on that scale using as radical a system. Their design study was to go to a definitive design and was rejected because it was felt it was starting too soon on that project.

Mr. STRAUSS. That is conceivable, but I am not on notice. I do not believe any member of the Commission has ever heard of it.

Dr. LIBBY. The staff, of course, does not speak for the Commission in all respects of this sort. I think one can get opinions from a staff member and take it as his. That is not to say that is the Commission's.

Mr. HAMILTON. Sometimes people outside do not always make the distinction that nicely.

Representative DURHAM. A request as important as this, would it not go to the Commission level—from a Government agency such as the Maritime Administration from any staff member on a matter of decision, would it not go to the Commission level?

Mr. STRAUSS. If such a request were made, yes; but I think we are just assuming it has been made and assuming it has been made formally. I cannot bring myself to believe it is anything beyond the most informal sounding. As I said, none of the Commissioners nor the General Manager have ever heard of it.

Representative DURHAM. It must have come from somewhere. The Budget Bureau certainly would not have rejected it without some information on the feasibility of such a project, would they?

Mr. STRAUSS. I cannot answer that. I do not know, sir. I cannot speak for the Budget Bureau.

Representative HOLIFIELD. Mr. Davis, do you know anything about this discussion of the Maritime we are talking about, the request of the Maritime Administration? Would that have come to your department?

Mr. DAVIS. Yes. They have been working with us for considerably over a year on ideas for building a nuclear-powered merchant ship, and last fall they did have a proposal in mind, which I had understood to be somewhat different from what Mr. Hamilton described, for which they did request funds in the amount of $17 million, as I recall. Their proposal was to utilize an existing type of reactor and put it into a merchant ship or some kind of available hull. I discussed this very briefly at one time with one of the fellows from the Bureau of the Budget and indicated that we had no objection to the idea but did indicate that we favored going ahead with more of a research and development program than a construction program. And this money, I understand, was subsequently taken out of their budget. I know that they tried very hard and we supported them with the idea of getting back perhaps a million dollars or so of it to initiate a research and development program, but this was not approved either, so far as I know.

Representative HOLIFIELD. In other words, they wanted to go ahead with exactly what the President now proposes to go ahead with.

Mr. DAVIS. No, I would not——

Representative HOLIFIELD. Practically that, now. They were going to take an existing hull and go ahead with an existing reactor, put it in. You are going to build a new hull now and go ahead with an existing type of reactor.

Mr. DAVIS. I think it was set in quite a different framework. They were not thinking of the international aspects of this in any way, considering only the desirability of doing this as a strictly domestic venture, which would be, they would hope, a first step toward a nuclear economic ship, which could be used by the Maritime Administration. This is an entirely different framework than the President's idea which is to utilize this as a demonstration of peaceful use of atomic energy to the world. I believe there is quite a considerable difference.

Representative HOLIFIELD. Yes, there is. This hinges completely, not upon economic feasibility or technological advance, but on the propaganda motive entirely, and it is up to this committee to judge whether the propaganda motive is justified at such expense or whether other things can be done which would be of more value from a propaganda standpoint.

(Discussion off the record.)

Mr. STRAUSS. The Shippingport Reactor which we are engaged in sponsoring and helping to construct and for which we are providing part of the funds is also, and it was when we began it, an obsolescent type of reactor. I would guess that the first merchant ship to sail the seas under nuclear power will inevitably be powered by an obsolescent type of system. A beginning has to be made. If a beginning is made by some other country and had this exchange of views not taken place, I believe that you would be properly critical of the Commission for not having initiated something of the sort.

Representative HOLIFIELD. If there is no objection and no further comment at this time on this subject, let us look at section 106 as revised for a moment from the standpoint of the Commission's attitude toward the language. I realize the lawyers have not had a chance to study it thoroughly but just from a standpoint of approval of the language, not any commitment on the part of the subcommittee.

Mr. STRAUSS. Would you like our comment on it?

Representative HOLIFIELD. Yes.

Mr. STRAUSS. Obviously I have not had an opportunity to consult with the Commission, and if any of the Commissioners object to this I hope you will permit them to speak.

General Fields, will you comment?

Mr. FIELDS. We had slightly different language in the one we proposed near the end of the clause, the third from the last sentence where it says—

And the Commission certifies further that it is unable to enter into a contract—

then we would propose going back to the language that was originally in 106 which would go—

And the Commission certifies further it is unable to enter into a contract with any person including a licensee on terms satisfactory to the Commission to furnish from a privately owned plant or facility the product or services to be provided in the new project.

Mr. ALLARDICE. That was my oversight. I forgot that correction because 106 was dropped in markup and I did not consider it again.

Mr. FIELDS. Yes.

Representative HOLIFIELD. With that change then, you are in substantial accord with the language, I assume?

Mr. FIELDS. Yes.

Representative HOLIFIELD. And if after further study you want to confer with the staff as to any minor changes in the phraseology, feel free to do so.

We will consider then the language as you suggested as amended when we come to our conclusions.

Mr. FIELDS. I believe this will be satisfactory, on my first reading of it.

Mr. STRAUSS. Just a moment. Dr. Libby has raised a question which none of us has considered or mentioned.

In opening this point, Mr. Chairman, I referred to weapons and the production division and pointed out that there might be changes in weapons characteristics or weapon logistics, but there is another phase of our work that is very intimately tied into defense, and that is propulsion for military craft of one sort or another and, particularly, under present circumstances, as Dr. Libby pointed out, aircraft nuclear propulsion.

Let us suppose that during this 5-month period when Congress is out of Washington that a very important development in that field should occur where we would not want to lose the 5 months. Could some language be added there that will apply to military applications of atomic energy other than weapons and which would clearly cover that point? Is that the point, Dr. Libby?

Dr. LIBBY. That was my point, yes.

Representative DURHAM. Where the Commission certifies that the new project is essential to the common defense, does that not cover it?

Dr. LIBBY. I thought you had to have both 1 and 2.

Representative DURHAM. It seems to me that would cover almost anything.

Dr. LIBBY. Do you not have to certify to 2 also?

Mr. STRAUSS. If you change the word "and" to "or," it would be all right, but otherwise we could not say that the aircraft nuclear propulsion bore upon either weapon characteristics or logistics operation.

Mr. FIELD. There would also have to be reference to another paragraph then.

Representative HOLIFIELD. Of course that would open it up completely over the whole universe. There would be no reason for having any kind of a restriction at all if that was adopted. We might as well face it.

Representative COLE. What would be the harm of adding in your clause 2, "required by changes in weapons characteristics, weapon logistic operations, or nuclear propulsion"?

Mr. FIELDS. Along with that, Mr. Cole, then there would have to be a reference to the subsection in which the nuclear propulsion categories occur. That is 101 (b). It is certainly true that the aircraft nuclear propulsion program may have things developing in it within the next 5 or 6 months which would be different than we are planning now.

Representative DURHAM. I am glad to hear you get that apprehensive.

Mr. FIELDS. I think it would fall in some kind of a supporting facility during the period of this budget. I am not aware of any need at the moment, but it would be some test facility or some such thing and there are items in there for that at the present time.

Representative HOLIFIELD. Yes, sir, there certainly are.

Representative DURHAM. If we can put anything in there to speed it up, good and well.

Representative HOLIFIELD. Are there any further questions or comments by the members of the committee? Does the staff have any questions?

Dr. LIBBY. I merely wanted to call the committee's attention—I know you are all behind the ANP and so are we. It just occurs to

me in the program we might have some unforeseen contingency develop.

Representative HOLIFIELD. Mr. Hamilton.

Mr. HAMILTON. I do not want to appear to be reversing the ends of the table, but I have talked with Dr. von Neumann about the possibility that in the next 6 or 12 months we may find * * * which could conceivably start beyond the paper stage for which we have no budget provisions at all at the present time.

Mr. LIBBY. That slipped my mind. That is another thing.

Mr. HAMILTON. It is one area where the staff is aware of a possible sudden pickup of activity.

Representative HOLIFIELD. Would that not come in weapons characteristics?

Mr. HAMILTON. It might conceivably.

Mr. FIELDS. We had not construed it in that fashion, the words "weapon characteristics," when we set that down.

Representative HOLIFIELD. How about the weapons logistic operations?

Mr. FIELDS. It would not fit in there.

Mr. STRAUSS. It would be really stretching the meaning of the words.

Representative DURHAM. It is always brought up that something is going to happen and Congress is going to be out of session. I have heard it since 1938 by the Army, Navy, and the Air Force, and I do not know at any time Congress has not fully met its responsibility in every matter of defense. I do not think anybody needs to worry about it. If it becomes critical enough we can come back and it will be done. So I just feel like this is not any different. We have had developments that have been just as radical, and changes over the past 20 years, as some of these are going to be. Airplanes, for instance.

Representative HOLIFIELD. Is there any further comment from any of the Commissioners?

Mr. STRAUSS. No, Mr. Chairman.

Representative HOLIFIELD. Then we will excuse the Commission at this time, gentlemen.

(Whereupon, at 12:15 p. m., Tuesday, May 31, 1955, the subcommittee closed the hearing and moved to other business.)

APPENDIXES

APPENDIX A

Supplemental Information on Argonne Reactor School

The school at the Argonne National Laboratory has been established to implement in part the President's "atoms for peace" program. As established, the school is to provide training in the classified, but less sensitive, areas of reactor technology as soon as a sufficient number of bilateral agreements with foreign countries have been signed to warrant giving such training. This training is to be made available to domestic as well as foreign students. In the interim, unclassified courses will be presented.

Three locations for the school were initially considered: Oak Ridge National Laboratory, Argonne National Laboratory, and Brookhaven National Laboratory. Oak Ridge National Laboratory was ruled out because of the proximity of production facilities and the fact that there already existed at Oak Ridge the classified training school for AEC, AEC contractor and military personnel. Argonne was finally selected over Brookhaven because the school was to eventually teach classified courses and it was hoped that Brookhaven would eventually be completely unclassified.

The interim session (March 1955) of the ANL School of Nuclear Science and Engineering was initially established to provide training for approximately 20 foreign students and 10 American students. Forty-one applications of qualified students from 20 foreign countries were received, as well as 12 applications from students sponsored by American industry. The Department of State felt that at least one candidate, and in most cases, more than one candidate, should be accepted from all foreign countries nominating students. As a consequence, 35 foreign students were accepted, although because of inability on the part of some of these students to get to the United States in time, only 30 students from 19 countries are attending the first course. In addition to these, nine students from American industry have been accepted for enrollment.

The Department of State has indicated that a number of countries did not nominate a student for the first course only because of the short time available to select a candidate. However, they plan to nominate students for the second course. It is presently felt by the State Department and FOA that we can reasonably expect from 100 to 120 qualified applicants from abroad for the second session, and we should be prepared to accept in the neighborhood of 80 to 90 foreign applicants.

To accommodate this anticipated demand, we propose to construct a facility to accommodate 120 students at an estimated cost of $750,000. Design is under way utilizing $38,000 of funds currently available to the Commission. Construction funds of $712,000 are included in the 1956 construction program for which authorization by the Congress has been requested.

Since authority to begin construction of the school facilities will not be available until July 1 next, they cannot be completed in time to permit expansion of the classes for the second course which has been erroneously announced to commence in the fall of 1955.

The State Department has been informed of the construction problem involved and the following alternative has been offered. The AEC would start the second course on or about November 1, 1955, as originally planned, but limit enrollment to 35 foreign students and eight or nine American students. (This is the maximum number under existing facilities that can be accommodated.) The duration of the course would be 7 months, the same as the first course. Construction of the facility to handle approximately 120 students will be completed about July 1, 1957. However, limited beneficial occupancy could be obtained on or about March 1, 1956. As a consequence, and in conjunction with the announcement of the second course, the AEC would offer a third course, to start on March 5, 1956, open to approximately 60 foreign students and 20 American students to run con-

currently with the second course through June 1956. Courses subsequent to the third course would be determined at some future date. The State Department has concurred with this proposed schedule.

The tuition charged is equivalent to and based upon the estimates of the direct costs of operating such a school drawn upon the experience at ORSORT. The course being 7 months in length instead of 12 months, the ORSORT tuition has been prorated and $1,500 is being charged for the course. This tuition fee includes all incidental fees, textbooks, and laboratory materials and is payable upon enrollment in the school. The tuition fee does not include medical expenses, housing, food, or other living expenses.

For the next two 7-month courses (second and third), the tuition fee will be $1,500 for all students. This tuition fee will return all but $44,000 of the estimated direct costs for this program.

Direct costs	$230, 000
Indirect costs	446, 000
Depreciation	35, 000
Gross cost	711, 000
Tuition	186, 000
Total net cost	525, 000

Direct costs include salaries of the school staff, payments to guest speakers, and the cost of books and other classroom and laboratory supplies and services. The indirect costs include the proportionate share of operation of the ANL. This includes such items as utilities, fire, safety, shuttle services, food services, and administration costs.

The direct operating costs at ANL are higher than at ORSORT primarily because of the wide range in background of the foreign students. In the present class, the background of students range from B. S. in civil engineering with no experience through Ph. D. in physics with 15 years experience of which 3 years were with an atomic-energy project of a foreign government. As a consequence, a number of courses reflecting different levels must be offered in the various subject matters increasing substantially the number of teachers required.

Some foreign students may receive financial assistance while attending the school through the Foreign Operations Administration or grants through the Department of State IES program. It is our understanding that the FOA or the Department of State in those cases pays the tuition for the students and assists the students with a per diem and travel allowance. The AEC gives no financial assistance other than the difference between total costs and the tuition charged. The tuition fees established cover almost all of the direct costs in the operation of the school, but they do not cover those indirect costs of the operation of the Argonne National Laboratory which are charged against the school and the depreciation costs of facilities and equipment of the school.

Students for the school are selected by a Committee on Admissions composed of representatives from the school and the AEC. Foreign students receiving awards under the Educational Exchange Service or as participants in the technical assistance program of the Foreign Operations Administration required the approval of the United States Department of State and/or the Foreign Operations Administration. The selection of students is based upon the qualifications of the applicants and the real need of the sponsoring foreign government for scientific personnel trained in the field of nuclear energy. Consideration is necessarily given to the available facilities of the school. The equivalent of a bachelor's degree in physical science or engineering with high academic standing plus at least 2 years professional experience or 1 year of pertinent graduate study is the basic scholastic requirement for admission. As all courses are presented in English, a fluent command of oral and written English is mandatory for foreign students. All United States applicants for admission to the school must be sponsored by an industrial organization having a demonstrated interest in the development of atomic energy. All foreign applicants must be sponsored by their respective governments.

As the curriculum of the school for the next two courses is concerned only with unclassified or declassified subject matter, no formal security clearance is now required for attendance. Applicants from the United States will be given such screening as is customary for employment at the Laboratory of personnel not having access to classified information. Applicants of foreign origin will be

required to qualify for appropriate clearance under all pertinent immigration laws and regulations.

The announcement of this training program has been very well received by foreign governments. At the same time, it has helped our own scientific program by giving our scientists the benefits and views of scientists from other countries who are studying under this program.

APPENDIX B

Cost Study of Installation of Electrical Generating Equipment on Nuclear Powered Merchant Ship

In accordance with the request made at the hearings of May 9, 1955, the Atomic Energy Commission staff has prepared approximate estimates of costs of various equipment installations in the nuclear powered merchant ship proposed by the President. In all, five separate equipment installations were assumed.

A tabulation of these five equipment installations is as follows:

Case	A	B	C	D	E
Ship propulsion	Nuclear	Nuclear	Nuclear	Nuclear	Conventional.
Propulsion machinery	GT [1]	TE [2]	TE	TE	GT.
Shore power	None	10MW	10MW	20MW	10MW.
Reactor	1	1	2	2	1.
Acceptable	Yes	No	Yes	Yes	Yes.
Total machinery plant [3]	$21	$21.5	$33	$37	$24.5.
Core cost [3]	$3.5	$3.5	$7	$7	$3.5.

[1] Geared turbine.
[2] Turboelectric.
[3] Costs shown in millions of dollars.

DISCUSSION

Case A

This is the equipment installation presently proposed. This ship would have nuclear propulsion through a geared turbine drive. It has no facilities for delivering power to the shore. From an engineering standpoint this is an acceptable installation.

Case B

This ship would have nuclear propulsion through turboelectric drive and would be capable of delivering 10 megawatts of shore power when in port. Since it would have only one reactor, this reactor would be in operation for ship propulsion when at sea and for shore power when in port. There would be no time available for maintenance, routine upkeep and minor repairs; for this reason, from an engineering and operating standpoint, this equipment installation is not acceptable.

Case C

This ship would have nuclear propulsion through a turboelectric drive and would be capable of furnishing 10 megawatts of electric power to the shore when in port. It would have two reactors, either of which could be used for either ship propulsion or generation of shore power. Since one reactor would be inoperative at any given time, repair work and maintenance could be done on it while the other reactor is in full operation; therefore, from an engineering and operating standpoint, this equipment installation is acceptable.

Case D

This ship would have nuclear propulsion through a turboelectric drive and would be capable of supplying 20 megawatts of electrical power to the shore. It would have two reactors and for the reason stated in case C above would, from an engineering and operating standpoint, be acceptable. This ship, however, would have an additional set of generating machinery so that it could provide the additional 10 megawatts of electrical shore power.

Case E

This ship would have conventional propulsion (using fossilized fuel) through geared turbine drive. It would have 1 reactor which would provide 10 megawatts of electrical power to the shore. From an engineering and operating standpoint, this equipment installation is acceptable; but it is not acceptable for this project in that it does not provide for nuclear propulsion of the ship.

REMARKS

1. In all cases above, the only type reactor considered is the STR Mark II, similar to that presently installed in the submarine *Nautilus*.

2. As explained in case B, two reactors are needed for reliability if a nuclear propelled ship is to provide nuclear generated shore power.

3. There are many problems in delivering shore power to a foreign port. One of these would be that the alternators installed for shore power would probably be designed to deliver electrical power at 60 cycles. Some ports would require 50 cycles, direct current or possibly some other frequency. If a 60 cycle generator is operated at a reduced number of cycles, there would be much less power generated. If 60 cycles were fed into the lower cycle shore system, the shore equipment would overheat, unless partly unloaded. Of course, this entire problem could be solved by the installation of enough motor-generator sets to convert the electrical power to the specific requirement of each of the ports which the ship will visit. Such equipment has not been included in the estimates.

Another problem which must be solved is that few ports would have adequate cable runs to the wharves and piers so that electrical connections could be made. This might necessitate the running of overhead lines at considerable expense to the Government.

Still another problem is that some of the ports to be visited might not have wharves that can berth a vessel of such draft. In this case the vessel would lie at anchor at some distance from the shore and a submerged cable would be required, which is a considerable undertaking.

APPENDIX C

Examples of Equipment Not Included in Construction Projects

Heavy mobile equipment.—Includes such heavy mobile equipment items as concrete mixers, power shovels, cranes, compressors, rollers, road graders, tractors, farm implements, boats, and barges.

Hospital and medical equipment.—Includes such hospital, clinical, and dental equipment as hospital beds, dentist chairs, instruments, sterilizers, and scientific equipment used by dentists and doctors.

Laboratory equipment.—Includes such laboratory equipment as microscopes, analytical balances, electroanalyzers, oscillographs, refractometers, light sources, vibrometers, slave manipulators and other remote control mechanisms, telemetering devices, very high speed cameras, and other scientific equipment, such as that used in the research installations at Brookhaven, Oak Ridge National Laboratory, Los Alamos, Argonne, and the University of California Radiation Laboratory.

Motor vehicles and aircraft.—Includes standard transportation equipment such as passenger cars, trucks, buses, jeeps, tractor trailers, fire trucks, and aircraft.

Office furniture and machines.—Includes office furniture and equipment such as machines, desks, drafting sets, safes, duplicating machines, and any special items of office equipment.

Process equipment.—Includes equipment used specifically in product manufacturing and processing, such as that used in the large gaseous diffusion plants at Oak Ridge, Paducah, and Portsmouth and the large production facilities at Savannah River and Hanford, and other specialized process equipment associated with the weapons program.

Railroad rolling stock.—Includes all railroad rolling stock such as locomotives, cars, and associated railroad equipment.

Reactors and accelerators.—Includes reactors, proton synchrotrons, electron synchrotrons, cyclotrons, linear accelerators, Van de Graaff generators, bevatrons, and accessory equipment including associated measurement and control instruments.

Security and protection equipment.—Includes equipment used for security, police and fire protection purposes (except automotive vehicles included above), and special electronic devices used for security purposes.

Shop equipment.—Includes such shop equipment as lathes, drilling machines, rolling mills, hoists, grinders, forges, pipe cutting machines, presses, saws, shapers, and other equipment usually associated with shops, garages, and maintenance facilities.

Miscellaneous equipment.—Includes the cost of equipment which does not fall within any of the specific categories listed above. Examples are equipment required for outfitting exploration parties, such as house trailers, portable light plants and generators, and other camp equipment; telephone and radio communications equipment for intra- and inter-plant use; experimental core drills; large commercial-type vacuum cleaners for hospitals; certain school equipment; gas cylinders; etc.

Motor vehicles

Type	Estimated, fiscal year 1955				Estimated, fiscal year 1956		
	On hand June 30, 1954	Acquisitions	Disposals	On hand June 30, 1955	Acquisitions	Disposals	On hand June 30, 1956
Passenger vehicles:							
Automobiles	2,081	241	441	1,881	[1] 442	447	1,876
Station wagons	100	16	14	102	27	27	102
Ambulances	67	1	1	67			67
Buses	574		116	458	10	66	402
Total	2,822	258	572	2,508	[1] 479	540	2,447
Trucks: All types	8,607	744	1,129	8,222	[2] 934	934	8,222
Total, all types	11,429	1,002	1,701	10,730	[1] [2] 1,413	1,474	10,669

[1] Includes 40 to be procured from construction project funds.
[2] Includes 110 to be procured from construction project funds.

Estimated motor vehicles and aircraft requirements, fiscal year 1956

Type	Number	Cost
Passenger vehicles:		
Automobiles	402	$518,334
Station wagons	27	54,900
Ambulances		
Buses	10	54,600
Total	[1] 439	627,834
Trucks:		
All types	824	1,823,418
Trailers	2	6,876
Total	[2] 826	1,830,294
Aircraft: Single engine (small)	3	18,000
Total, all types	1,268	2,476,128

[1] Excludes 40 sedans to be procured from construction project funds.
[2] Excludes 110 trucks to be procured from construction project funds.

Aircraft

	Estimated, fiscal year 1955				Estimated, fiscal year 1956		
	On hand June 30, 1954	Acquisitions	Disposals	On hand June 30, 1955	Acquisitions	Disposals	On hand June 30, 1956
Aircraft	14	4	1	17	3	0	20

Aircraft other than AEC owned, May 10, 1955

Operations office	Number of aircraft	Use	Operational arrangement
Oak Ridge	3	2 planes are used for transportation between Knoxville and Portsmouth and Paducah to save travel time; 1 helicopter is used for transportation between Oak Ridge and Knoxville.	On bailment agreement from U. S. Air Force. Operated by Management Service, Inc., under contract with AEC.
Santa Fe	7	For transportation of passengers and cargo between Albuquerque and Los Alamos; Livermore, Calif., and Las Vegas and Mercury, Nev.; and during continental tests, between Las Vegas and Mercury, Nev., and to such other points in United States as directed by AEC.	Carco Air Service agrees to have these planes available for use. SFO Contract No. AT (29-1)-Gen-97.
	2	For transportation of passengers and cargo between Albuquerque and such other points in United States as directed.	Operated by Carco Air Service under SFO contract. On bailment agreement from U. S. Air Force.
Grand Junction	(1)	Aerial photography and trip service	AEC contract with Monarch Aviation, Inc., provides that service shall be available upon 12 hours' notice.
	(1)	Used for geological reconnaissance when a high-wing plane is required.	Navajo Flying Service contract with Walker-Lybarger Co. provides for availability of this plane.

[1] Service as required.

Aircraft owned by AEC, May 10, 1955

Operations office	Number of aircraft	Use
Hanford	4	Security patrol.
Grand Junction	11	Used for airborne gamma radiation surveys and geologic reconnaissance.
Total	15	

APPENDIX D

Proposed Paragraph Re Engineering Test Reactor for Use in Appropriation Authorization Report

In approving the construction of an Engineering Test Reactor in the amount of $14,350,000, the committee has noted the urgent need for the project in carrying out development work in the aircraft reactor program. It is understood that in assigning testing space in this reactor, the Atomic Energy Commission will give high priority to work under the ANP program.

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